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Guidebook for Analysis and Design Phases of Course Revision

John E. Morrison
Human Resources Research Organization

ARI Field Unit at Fort Knox, Kentucky
Training Research Laboratory

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John E. Morrison
Human Resources Research Organization

Donald M. Kristiansen, Contracting Officer's Representative

Submitted by
Donald F. Haggard, Chief
ARI Field Unit at Fort Knox, Kentucky

Approved as technically adequate
and submitted for publication by
Harold F. O'Neil, Jr., Director
Training Research Laboratory

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES
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This guidebook is intended to provide the Army training developer with a job aid for revising a course of instruction. The guidebook is based upon the methods used to revise the Basic Noncommissioned Officer Course for M1 tank commanders (19K BNCOC) and contains numerous examples from this course revision project. The procedures for developing instruction are organized around the following eight activities: (1) examine/revise course objective, (2) describe course entrants, (3) revise task inventory, (4) select (Continued)

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20. (Continued)

tasks for training, (5) revise/develop training objectives, (6) organize training objectives, (7) develop tests, and (8) outline training program.

FOREWORD

The ARI Fort Knox Field Unit has been involved for approximately ten years in the development of innovative approaches to training for the Armor community and for the Army as a whole. Just recently, this effort has been given special emphasis through formation of the Training Technology Field Activity (TTFA), a partnership among ARI, the Training and Doctrine Command, and the U.S. Army Armor Center and School. The purpose of the TTFA is to increase the effectiveness and efficiency of training through the application of appropriate new technologies.

Initial efforts of the Fort Knox TTFA have been concentrated upon the institutional program for training M1 tank commanders. Before introducing new technologies into the training program, it was necessary to ensure that the appropriate groundwork had been accomplished in terms of instructional analysis, design, and development. The first report on this work presented the results of the analysis phase by providing a review and supplement of available job and tasks analyses for the M1 tank commander duty position. The second report built upon the analysis phase by presenting a general design for an M1 tank commander training program. Other reports currently in preparation present selected training and evaluation products for the training program as well as an example instruction on decision making and problem solving tasks.

The present report is a guidebook for the analysis and design phases of course revision. The procedures presented in the guidebook are based on those used to revise the training program for M1 tank commanders. Illustrations of procedures are taken from that course revision process. The guidebook is intended to provide a useful "how to" reference for revision of future training programs.

EDGAR M. JOHNSON
Technical Director

GUIDEBOOK FOR ANALYSIS AND DESIGN PHASES OF COURSE REVISION

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GUIDEBOOK FOR ANALYSIS AND DESIGN PHASES OF COURSE REVISION

CHAPTER 1

INTRODUCTION

1-1. Background. The present job aid was developed as a part of a project in which the Systems Approach to Training (TRADOC Regulation 350-7) was applied to revising the Basic Noncommissioned Officers Course for M1 tank commanders (19K BNCOC). The purpose of the revision was to incorporate state-of-the-art training technologies into 19K BNCOC. At the outset of the project, it was recognized that the procedures for the Systems Approach to Training (SAT) were sometimes ill-defined and inappropriate to particular situations. One of the purposes of the project was to make appropriate elaborations of and modifications to SAT and try them out in revising 19K BNCOC. The procedures used to revise 19K BNCOC are documented in the present job aid, which is designed as a guide to future course revision projects.

1-2. The State of Instructional Systems Development.

a. SAT is but one example of a class of procedures under the more general rubric of instructional systems development (ISD). Though differing in the procedural details, all ISD models are cast within a systems framework and have the following general characteristics:

(1) The content of training is specified in terms of training objectives that are derived from an analysis of the student's prospective job. Each training objective is a precise statement of the conditions, actions, and standards for performing a particular job task or group of tasks.

(2) Performance criteria are developed to provide evidence that a student has achieved a particular training objective. It is significant to note that in ISD models performance criteria are derived directly from the training objectives rather than from existing instruction.

(3) Methods of instruction are devised to help students attain the training objectives in an efficient manner. In other words, the purpose of instruction is to maximize student performance on the specified criteria.

(4) The training system is continuously evaluated and modified. If, for instance, a particular training approach is not effective in producing acceptable performance levels, the approach is changed and the effect on performance is measured. This principle of iterative evaluation and modification extends to other components of the instructional system as well.

b. It is important to emphasize that, although ISD models share some common characteristics, there is no single universally accepted set of procedures for carrying out instructional development. In fact, Goldstein (1980) commented that "there are almost as many systems approaches as there are authors on the subject" (p. 231). The proliferation of procedures is not necessarily a negative aspect of ISD given the inexactness of instructional science and the systems principle of iterative evaluation and modification. Although the present guide does not present a formal review of other approaches to ISD, there is an outline of the similarities and differences between the present approach and other relevant approaches in an appendix to this guide.

1-3. Scope of the Present Guide. Some of the limitations, applications, emphases, and other general characteristics of the present guide are described below.

a. Limited to Course Revision.

(1) The present guide is designed to apply to revising an existing course of instruction rather than creating one anew. This should not be a serious limitation in that most training development projects are actually revisions of existing courses. The most probable reason for revising a course is the fielding of new military equipment that is related to a particular course of instruction. The recent tank force modernization project to replace M60 series tanks with M1 tanks is a case in point. In such cases, the new equipment replaces older equipment that is similar in function and/or operation. Therefore, much of the task documentation and other materials from the old course are still relevant to some extent to the revised course.

(2) Other approaches to ISD have provisions for incorporating existing training materials into a newly developed course of instruction. However, they typically ignore existing documentation from the earlier analysis and design phases. The effects of integrating this sort of valuable documentation into the revision process whenever appropriate is to save a significant amount of course development time and to prevent the developer from "reinventing the wheel."

b. Applies to Only Analysis and Design Phases. SAT procedures are divided into five phases of development process: evaluation, analysis, design, development, and implementation. The present guide applies only to the analysis and design phases, typically the first two steps in the revision process. This division of the revision process is significant in that the first two phases can be accomplished by the training developer/reviser himself, perhaps with the assistance of a small staff. The work involved in later phases is typically parcelled out to other personnel and organizations: development to the Directorate of Training Development (DOTD) and/or to an instructional department (e.g., Weapons Department, Maintenance Department, etc.); implementation to the instructional staff of the existing course; and evaluation to the Directorate of Evaluation and Standardization (DOES). In a sense then, the present guide is designed to get the training developer started revising the course before he hands off parts of the process to others.

c. Emphasis on the "How To" of Course Revision. One notable aspect of SAT is its overemphasis of the "what" of training development at the expense of the "how to." That is, Regulation 350-7 lists a series of minimum essential elements (products of various analyses) but fails to specify procedures for developing those elements. In general, the regulation refers the developer to other related documents for procedural details. Most important of these supporting documents is the Interservice Procedures for Instructional Systems Development (TRADOC Pamphlet 350-30) herein referred to as IPISD. Although many procedures for SAT products are given in IPISD, some are not. In contrast to the SAT document (Regulation 350-7), the emphasis of the present guide is on the "how to" (i.e., the procedures) of course revision. Examples from the 19K BNCOC project are presented to illustrate many of the procedures described in the text.

d. Emphasis on the "Doable." Many of the procedures cited in IPISD are certainly valid, but they are impractical given the time and resource constraints facing a typical course developer/reviser. An important criterion for in luding a particular procedure in the present guide was that it appeared "doable" within such constraints.

e. Based on 19K BNCOC and Other Sources. Related to the preceding point, one of the advantages of the present procedures compared to other guides to training development is that they are based on a "real world" application of SAT rather than on an abstract conceptualization of how training should be developed. On the other hand, results from the field tryout indicated that the proposed procedures were not always complete and/or practical. In order to present a useful job aid, it was necessary to supplement the procedures used in redesigning 19K BNCOC with procedures proposed in other sources. Not all of these sources are referenced in the text. They are nevertheless included in the Bibliography at the end of the guide in order to provide additional resources that could be useful to the course developer/reviser.

f. Emphasis on Interactions. Although most of the actions required in the analysis and design phases of course revision can be accomplished by a single individual, this does not mean that he or she should work in a vacuum. The course reviser should constantly be in touch with both subject matter experts (SMEs) for technical advice and his supervisors for decisions on training management matters. The appropriate points for such interactions are identified in the present procedures.

g. Eight Major Activities. The process of course revision is organized around eight major activities or phases. The activities are named to convey the output of each phase rather than describe the action involved. For example, the SAT activity named "Analyze Tasks" is herein referred to as "Revise/Develop Training Objectives." While it is true that this phase involves analysis of job tasks, the outcome of the analysis (i.e., the training objectives) is not immediately obvious, especially to the novice course developer/reviser. The correspondence of these activities to the components of other ISD models is shown in the Appendix. The following eight activities are described in detail in the subsequent chapters of the guide:

(1) Examine/Revise Course Objective

(2) Describe Course Entrants

(3) Revise Task Inventory

(4) Select Tasks for Training

(5) Revise/Develop Training Objectives

(6) Organize Training Objectives

(7) Develop Tests

(8) Outline Training Program

CHAPTER 2

EXAMINE/REVISE COURSE OBJECTIVE

2-1. Introduction. Before beginning the process of course revision, you must closely examine the overall purpose of the course. In accordance with current ISD models, the process of course revision is viewed as a system. The course objective provides an overall goal for the process thereby providing a unifying function in the system.

2-2. Identify Need for Revision. Make sure you understand the reason for revising the course. Example reasons include the introduction of new equipment or the reorganization of job functions. The exact need for revision should be discussed at length with training management. A memorandum may be needed to clarify the understanding between you and training management.

2-3. Examine the Present Course Objective. A statement of the present course objective can be found in the Preface of the Program of Instruction (POI). Examine the adequacy of the objective with respect to the identified need for revision. The basic question is whether or not the statement accurately describes the objective of the revised course of instruction. You may wish to discuss this issue with personnel who are knowledgeable about the present course. Such knowledgeable people include course developers, instructors, course graduates, etc. Be sure to keep these discussions at a very general level and not at the level of adding or deleting specific tasks.

2-4. Modify Course Objective. If the present course objective is inadequate, it should, of course, be appropriately modified. As general guidelines, the course objective should include the following elements:

a. Who Is to Be Trained. The course objective should include the type of personnel being trained, i.e., enlisted personnel, noncommissioned officers, officers, etc.

b. What Is to Be Trained. Include a general statement of what personnel are being trained to do. If the statement is not sufficiently clear you can include the sorts of tasks that the job incumbent will be expected to perform. Examples include:

(1) to perform maintenance on a tracked vehicle,

(2) to drive an M1 tank, or

(3) lead a platoon.

c. The Result of Training. Describe the job a course graduate can perform as a result of training and the associated level of competency (familiarized, qualified, distinguished). Examples include:

(1) a distinguished tank gunner,

(2) a qualified platoon sergeant, or

(3) a familiarized turret mechanic.

2-5. Example Course Objective. The adequacy of the present course objective for 19K BNCOC was examined. The existing course objective did not include some of the elements discussed above. A suggested course objective might be:

> The objective of 19K BNCOC is to train noncommissioned officers to command an M1 tank. Included in the course are tasks related to operating and maintaining the M1 tank commander's station as well as tasks concerned with the leadership, training, and direction of the tank's crew. The course graduate will be fully qualified to command an M1 tank.

2-6. Have Revised Objective Approved. Submit in writing any revision of the course objective to training management for their approval. Emphasize the importance of course objective as a statement of the basic parameters to course revision. For that reason, secure management's approval of the objective before proceeding with course revision.

CHAPTER 3

DESCRIBE COURSE ENTRANTS

3-1. Introduction.

a. In order to develop an appropriate course of instruction, you will need to determine the relevant skills, knowledges, and aptitudes that students possess prior to entering the revised course. According to IPISD, this determination is accomplished by obtaining a sample that is representative of course entrants, and then measuring their performance on tests derived from an analysis of the training objectives (Chapter 8). Training objectives are then adjusted in accordance with soldier performance. The results from a field study of ISD users (Vineberg & Joyner, 1980) indicated that such procedures were not used in development of actual courses. These investigators concluded that the advantages of having this sort of information about course entrants are probably outweighed by the time and expense involved in obtaining appropriate subjects and in measuring performance prior to actual implementation of the course.

b. In the present section, a modified set of procedures is presented for describing course entrants. The data collection requirements of the IPISD are eliminated by restricting the analysis to data that are a matter of record. One possible source of information about course entrants may be obtained from the results of any pre-course tests. Another source is biographical information about a course entrant's experience and ability level. The purpose of the modified procedure is to collect all available information about course entrants that might be relevant to the course revision process.

c. For the most part, there is a sequential logic to the phases of course revision. This is because the products of one phase serve as input to the next phase. In contrast, the location of the present phase (Describe Course Entrants) in the sequence is not immediately obvious for a couple of reasons. First, while helpful, the output of this phase is not a requirement for any other phase in course revision. Consequently, this phase may be bypassed if appropriate data are not available. Second, if data are available, this phase can potentially provide input to a number of other phases. Because of this potential impact, the analysis of course entrants should be accomplished as early as possible in the course revision process if the relevant data are available.

3-2. Obtain Student Data. Some sort of student records should be maintained by the faculty of the existing course. Request permission to take a quick inventory of all the available information on students who have enrolled in the course. There are essentially two types of data: biographical data on student background and abilities, and performance data from various precourse tests that are presently being administered. Record any information that might be relevant to student performance in the course. Be as inclusive as possible in obtaining data. It is sometimes difficult to foresee the significance of the data until after they have been collected and analyzed.

3-3. Analyze Biographical Data. Biographical data include information such as age, number of years in service, highest formal military training, last SQT score, etc. These data are sometimes obtained by means of questionnaires administered during in-processing for the present course. The following are some suggested methods for analyzing and interpreting the data.

a. Construct Frequency Distributions. A standard statistical method for summarizing data is to construct a frequency distribution. A frequency distribution is a table that lists all values of a variable along with the corresponding frequencies of occurrence. Biographical data may be either quantitative or qualitative. Quantitative information is where the student information is expressed in numbers, e.g., age in years, SQT scores, etc. In contrast, qualitative data is where student responses are not numerically related. Examples of qualitative data include highest formal military training, parent unit, present job, etc. The procedures for constructing frequency distribution differ for quantitative and qualitative data.

(1) Qualitative Data. The procedures for constructing frequency distributions for these data are fairly straightforward.

(a) Determine the possible range of responses to a qualitative question. Using 19K BNCOC as an example, course entrants were asked to name their current job. The respondents gave four different answers: tank commander, gunner, driver, and instructor.

(b) Next, determine the number of soldiers who gave each sort of answer. Of the 38 soldiers who gave interpretable answers to the example question, 24 were tank commanders, 5 were gunners, 8 were instructors, and 1 was a driver.

(c) Construct a table which lists each response along with the corresponding number or frequency of soldiers giving each sort of response. An example distribution is given in Figure 3-1 that lists the results from the question about entrants' current job. As in the current example, you may wish to include a column for the total number of responses in order to determine the relative proportion of responses in each category.

(2) Quantitative data.

(a) Frequency distributions for quantitative data are similarly constructed. However, the number of possible responses may be very great for a quantitative variable. For example, a quantitative variable such as weight could potentially have an infinite number of possible responses depending on the level of precision of the measuring scale. For that reason, the frequency distribution table often lists classes of responses instead of individual responses. The following are some standard statistical conventions that are used to derive appropriate classes of quantitative responses:

Present Job	Frequency
Tank Commander	24
Gunner	5
Driver	1
Instructor	8
Total	38

Figure 3-1. Example Frequency Distribution for Qualitative Data

1 All classes must have an equal range of responses. This range is usually referred to as the interval size.

2 For larger samples (i.e., greater than 50 soldiers) there should be between 8 to 15 intervals. However, the number of intervals may be somewhat smaller than 8 for smaller samples.

3 The interval size should be either 2, 3, 5, or a multiple of 5.

4 The lowest score in each interval should be an even multiple of the interval size.

(b) An example of a quantitative frequency distribution is presented in Figure 3-2. In this example, 19K BNCOC entrants were asked to report the number of years they had been on active duty. After experimenting with several interval sizes, an interval size of two was determined to be most appropriate for this relatively small data set. With an interval size of two, a total of six class intervals were needed to cover the entire range of data. Note that each of the intervals started with an even multiple of the interval size (i.e., two).

Years of Active Duty	Frequency
12 - 13	1
10 - 11	2
8 - 9	6
6 - 7	9
4 - 5	15
2 - 3	4
Total	37

Figure 3-2. Example Frequency Distribution for Quantitative Data

b. Describe the Typical Entrant.

(1) Identify the central tendency of the frequency distribution in order to describe the background of the typical course entrant. The central tendency of a distribution describes the response value around which the scores are centered. The most useful measure in this regard is the mode, which is defined as the value (or values) having the greatest frequency and, therefore, the highest probability of occurrence. The mode is also the most appropriate measure of central tendency because it may be used to describe qualitative as well as quantitative data. Using the two previously presented frequency distributions as examples (Figures 3-1 and 3-2), we may conclude that the typical 19K BNCOC is currently a tank commander with 4-5 years of active duty in the Army.

(2) If the data are extremely dispersed, the mode may not be a good representation of the central tendency. Dispersion refers to the degree to which the scores are scattered apart from one another. Consider the following example taken from the revision of 19K BNCOC (Figure 3-3). The scores in the example distribution are so dispersed that there is no clear central tendency, i.e., the mode does not provide an adequate description of the data. In a case such as this, you should reexamine the distribution as a whole to see if the data can be restructured to provide some other reasonable description of the distribution. In the present example, it may be seen that whereas there is no evident mode, a large majority (79%) of the tank commanders have less than 18 months on the job. This fact seems to be an important qualification to the previous assertion that the typical 19K BNCOC entrant is already a tank commander. That is, while the typical entrant is presently a tank commander, he has not served in that capacity for very long (less than 1.5 years).

Months on Job as TC	Frequency
36 - 41	2
30 - 45	0
24 - 29	1
28 - 23	2
12 - 17	6
6 - 11	7
0 - 5	6
Total	24

Figure 3-3. Example of Highly Dispersed Data

3-4. Analyze Performance Data. There are two types of precourse tests that may be administered to course entrants. The first type is an entry test, which measures performance on skills and knowledges that are prerequisites to the content of the current course. If an entrant fails an entry test item, he may be denied entry into the course or he may be given remedial training before he starts the course. The second type of precourse test is referred to as a pretest, which is a test on the objectives of the present course. An entrant who passes an item on a pretest may then skip the corresponding item, segment, or block of training.

a. Calculate the NO GO Rate. One of the simplest measures of performance on a precourse test item is the NO GO rate. The NO GO rate is defined as the proportion or percent of entrants failing a particular item. For instance, if 17 entrants out of a total sample of 83 fail a particular item, the NO GO rate is 17/83 = .20 or 20%.

b. Identify Performance Problems. Rank order the test items from the lowest to the highest NO GO rates. Extremely high (say, greater than 35% on an entry test) or low (less than 5% on a pretest) NO GO rates should be noted for interpretation.

3-5. Interpret the Data. The data gathered in this phase are necessarily limited to only the questions asked prior to the course or to the tasks covered in a precourse performance test. No conclusions can be drawn about matters that are not addressed by the data. Nevertheless, the following examples provide some ideas on how existing data might be interpreted.

a. Biographical Information.

(1) Examine the entrants' background and experience to see if they match the external requirements as stated in the course objective. If there are serious mismatches, you may want to modify the requirements. Failing that, you may have to modify the course objective to correspond with the reality of the situation.

(2) Take a look at the entrants' experience with the subject of the course. If students have no experience (i.e., they are being trained on a new vehicle), you will need to consider the possibility of providing appropriate orientation.

(3) Look at standardized test performance (e.g., the GT component of the ASVAB) and civilian educational level to predict whether or not entrants will need remediation on basic skills. You may have to provide for concurrent remediation through your local education center.

b. Performance Data. The interpretation of the performance data depends largely on the nature of the precourse test.

(1) For entry tests, you would expect a fairly low NO GO rate. High NO GO rates for an entry test would be an item of concern because it indicates that the course objectives assume a higher level of skills and knowledge than entering students actually possess. As a

result you might recommend that the previous prerequisite skills and knowledges be adopted as training objectives in the revised course.

(2) In contrast, you would expect a fairly high NO GO rate for items on a pretest. Low NO GO rates on a pretest would mean that students already possess some of the skills and knowledges that the course is intended to convey. These objectives should either be dropped from the course or only used as entry test items.

CHAPTER 4

REVISE TASK INVENTORY

4-1. Introduction. For purposes of analysis, a job consists of an inventory of individual units of work called tasks. In the present guide, the task "inventory" refers to the tasks that are to be trained in a particular course, not necessarily all tasks that are performed on a job. In this phase of course revision, you will review the tasks in the current inventory with respect to the course objective and revise the inventory appropriately.

4-2. Review Procedural Tasks. Most of the tasks in the current inventory are procedural in nature. That is, they are performed in a specific sequence of steps and can be readily trained and practiced. This list of tasks may be in need of change. Some relevant procedural tasks may have been omitted, and some tasks may no longer belong on the revised list. Also, some tasks may be improperly stated. Therefore, it is necessary to examine the existing task list and determine what changes must be made. The following is an outline of the review process for procedural tasks

a. Review Task Documentation. Information about procedural tasks can be obtained from a variety of sources. Review the documents in order to construct an accurate list of tasks trained in the current course. For various reasons, the documents may not agree with each other. Note each discrepancy for discussion in the following activity. The following documents should be used to determine the list of procedural tasks:

(1) The Current POI. This document provides the most basic reference on what tasks are being trained in the current course. It lists all the tasks within clusters as well as other information about the conduct and content of the course.

(2) The Master Task List. This task list for the Career Management Field (CMF) presents an inventory of all tasks in the CMF that subsumes the Military Occupation Specialty (MOS) in question. The Master Task List also indicates the suggested skill level (1-5) for each task as well as the appropriate site for training (institution, extension, or not recommended for training).

(3) The Soldier's Manual. This manual provides a Training Plan at the beginning of the manual which lists each task in the MOS along with the appropriate level for training the task (entry-level, primary NCO, basic NCO, etc.).

(4) The Training Schedule. The schedule for the current course lists the tasks in the sequence in which they are currently being trained.

(5) Information About New Equipment. If the primary reason for revising the course is to introduce new equipment, existing information about the equipment (e.g., draft operator's manual) must be obtained. Such documents must be carefully reviewed to identify any new tasks that need to be added to the inventory or any existing tasks that need to be modified.

b. Interview Personnel.

(1) Solicit the opinions of personnel who are knowledgeable about the present course concerning the revised tasks inventory and the overall course goal. First, prepare a tentative list of tasks identified from the documentation. Present this list to a small group of experts (less than eight) for their comments. Have the group review the list on a task-by-task basis and have group members respond as to whether they think that the task should be included in the revised course, dropped from the revised course, or modified from its present form. In addition, have the interviewees read and comment on the course objective as it presently stands. It is probably a good idea to tape record the session to prevent your having to take copious notes.

(2) Below are some suggested groups who can provide useful input to the development of a revised task inventory. In addition to the task-by-task review discussed above, the group members should also address the following points:

(a) Training Development Personnel. Ask these personnel about the discrepancies in task documents identified earlier.

(b) Instructors for the Present Course. Ask instructors to identify tasks that are presently difficult to train and to learn.

(c) Course Graduates. Ask course graduates to identify tasks that are difficult to perform on the job.

(d) Course Evaluators. Obtain any information internal evaluation personnel may have about the performance of students in formal testing situations. External evaluators should be asked about any significant feedback they might have received about course graduates from the field.

(e) Transition Trainers. If the primary reason for revising the course is to introduce new equipment, any personnel who are assigned to transition train present job incumbents on the new equipment provide an invaluable source of information. They should specifically address the impact of the new equipment on the task inventory.

c. Prepare Draft of the Procedural Task List. On the basis of the existing task list and suggested changes, prepare a draft of the revised task list. Be sure to indicate which tasks have been added to or deleted from the list and indicate which tasks have been modified. Also include a clear and concise rationale for each proposed change to the existing list. As a general rule, it is better to include than

exclude tasks at this point. The list will be pared down later in the course revision process.

4-3. Perform Limited Reanalysis of Job. At this point in the task list revision, you should look beyond traditional military sources to assure the completeness of the task list. Task documents may be too narrowly focused on procedural tasks. Nonprocedural tasks (e.g., decision making or others that are primarily mental in nature) may have been ignored in the original job analysis. If this is not the case, you may skip Section 4-3 and go to Section 4-4. However, if you have reason to believe that traditional job analyses have ignored tasks that are important to job performance, you should consider performing a limited reanalysis of the job. It should be noted that the sorts of job analyses described in IPISD and other documents are expensive and time-consuming procedures. What is described here is meant to be a limited reanalysis which should take a single analyst (e.g., the course reviser himself) less than two weeks to complete.

a. Identify/Define the Nonprocedural Activities.

(1) The reanalysis of the job should be limited in the sense that it focuses on just a few types of important nonprocedural activities that have been identified as important to job performance. The type of nonprocedural activity should be sufficiently defined so that an analyst clearly understands the activity in question.

(2) Using the 19K BNCOC example, it was felt that one of the nonprocedural activities overlooked by traditional analyses of the tank commander's job was decision making. In the context of commanding a tank, decision making was defined as behaviors where the tank commander is confronted with a situation in which alternative responses are possible, and he must decide which response is most appropriate.

b. Identify Functional Areas.

(1) In order to provide structure to the analysis, you should identify between 5 and 10 basic functions of the job. Possible functional areas are listed as task categories in the Soldier's Manual. Many functions are common to all combat arms MOS.

(2) For the 19K BNCOC example, the following functional areas were identified for decision making tasks:

(a) Movement,

(b) Detection/Identification,

(c) Gunnery,

(d) Sustainment,

(e) Communications,

(f) Training, and

(g) Personnel.

c. Identify Activities within Functional Areas.

(1) Within each of the functional categories, you should identify the mental activities that relate to the functions. Strive for a fairly complete listing of activities without regard to exact military or psychological terminology or to the contents of the present training program. SMEs may have trouble identifying nonprocedural activities because of their dissimilarity to traditional procedural tasks. When finished, have the list of nonprocedural tasks reviewed by other SMEs for completeness.

(2) The method used to identify the decision making tasks relevant to 19K BNCOC was to chronologically review one or two representative combat scenarios and list the mental activities that occur. The decision making tasks were then rearranged under functional headings. As as example, the analysis revealed the following tank commander decision making tasks that fall under the functional heading of Gunnery:

(a) Decide Whether or Not to Fire at Target(s),

(b) Decide Sequence in Which to Engage Multiple Targets,

(c) Decide When to Fire at Target(s),

(d) Decide What Weapon to Fire,

(e) Choose Appropriate Main Gun Ammunition, and

(f) Decide When to Stop Firing.

d. Relate Nonprocedural to Procedural Tasks.

(1) Many of the nonprocedural tasks coincide with or occur during the execution of one or more of the procedural tasks. To systematically examine the relationship between procedural and nonprocedural tasks, you should construct a crosswalk of the two types of tasks. The crosswalk is a matrix which lists all the procedural tasks on one dimension and all nonprocedural tasks on the other. An analyst should then indicate which of the nonprocedural activities occur during the execution of each procedural task. The purpose of the crosswalk is to identify where a nonprocedural activity might be trained within the context of procedural instruction. If an important nonprocedural activity is not related to any procedural task, you should add the task to the inventory. An alternative course of action is to develop a more standard procedural task which incorporates the nonprocedural activity in question.

(2) Such matrices were constructed for 19K BNCOC. The detailed findings were presented by listing each nonprocedural task and the procedural tasks to which they apply. Figure 4-1 presents an excerpt of the findings for only the decision-making that pertain to target detection and identification. The numbered items are the nonprocedural tasks, whereas the subordinate items are the procedural tasks to which they are related.

DETECTION/IDENTIFICATION

1. Decide Whether or Not to Override Designated Search Area

    a. Conduct Target Acquisition (Tactics)
    b. Direct Evasion of an Enemy Anti-Tank Guided Missile (Tactics)

2. Decide Where TC and Loader Will Search for Targets

    a. Conduct Target Acquisition (Tactics)
    b. Direct Evasion of an Enemy Anti-Tank Guided Missile (Tactics)

3. Decide Which Mode of Observation Will Be Used to Search for Targets

    a. Conduct Target Acquisition (Tactics)
    b. Direct Evasion of an Enemy Anti-Tank Guided Missile (Tactics)

Figure 4-1. Excerpt of Crosswalk Between Nonprocedural and Procedural Tasks

4-4. Finalize the Task Inventory.

a. Review Revised Task Inventory. After reconciling procedural and nonprocedural tasks, you should reexamine the task list as a whole to determine whether the tasks are in keeping with the course goal. It is certainly possible that, after the reanalysis of the training requirements, there may be some modification of the course objective.

b. Submit Inventory for Approval. After reviewing the tasks, submit the list to training management for their approval. Appended to the list should be reasons for any additions, deletions, or modifications of the current inventory. Also submit any proposed changes to the course objective along with the inventory. You should try to get management to do more than "sign off" on the list; you should actively solicit their suggestions for changes so that they have input in determining course contents. They may even wish other SMEs to review your work. Consolidate all the suggested changes along with the rationale for the changes in a memorandum for record.

CHAPTER 5

SELECT TASKS FOR TRAINING

5-1. Introduction. In the previous phase (Revise Task Inventory), the emphasis was on completeness. In all likelihood, your inventory of tasks probably contains too many tasks to be trained in any one course. The solution is to select only the most important tasks for training. In the current procedure, tasks are selected for training by a two-stage process. In the first stage, tasks are rated in terms of their criticality by subject matter experts (SMEs). In the second stage, training experts use task criticality and other information to select tasks which should be in the course.

5-2. Obtain Task Criticality Ratings. Obtain task criticality data by surveying an appropriate sample of SMEs.

a. Construct Task Survey. Individual task survey forms are used to obtain criticality ratings from SMEs. According to IPISD procedures (i.e., TRADOC Pamphlet 350-30), there are eight different dimensions of task criticality on which tasks may be rated. SMEs have found the requirement to rate tasks on multiple criteria tedious and not relevant to training development. In contrast, the recommended method here is to have SMEs rate tasks on a single dimension of criticality that is more directly related to job incumbents. The dimension being rated is how important each task is for the job incumbent to know. To construct an appropriate task survey, take the following steps:

(1) Develop Rating Scale. The rating scale should use terminology with which military personnel are familiar. The following four-point rating scale is recommended:

(a) must know: 4 points,

(b) should know: 3 points,

(c) nice to know: 2 points, and

(d) no need to know: 1 point.

(2) Develop Survey Format. The survey should be constructed such that it is easy for the SME to understand and easy for you to score. List tasks separately so that SMEs can indicate their rating for each task. In the example page from the 19K BNCOC survey (Figure 5-1), the SME indicates his rating of each task by circling the appropriate number beside each item. Rating instructions should be repeated at the top of every page of the survey to keep SMEs mindful of the rating scale.

INSTRUCTIONS: The following is a list of tasks which could be performed by the tank commander. How important is it for the tank commander to know how to perform these tasks? Circle the number corresponding to your rating using the following scale:

1	2	3	4
No Need to Know	Nice to Know	Should Know	Must Know

Encode/Decode Messages Using KTC 600D Tactical Operations	1	2	3	4
Conduct Training	1	2	3	4
Read/Report Radiation Dosages	1	2	3	4
Use Marginal Information on a Map	1	2	3	4
Prepare Commander's Weapon Station (CWS) for Operation on an M1 Tank	1	2	3	4
Determine a Location on the Ground by Terrain Association	1	2	3	4
Engage Targets with the Caliber .50 M2 HB Machinegun on an M1 Tank	1	2	3	4
Determine Azimuth Using a Protractor and Compute a Back Azimuth	1	2	3	4
Conduct a Map Reconnaissance	1	2	3	4
Call for and Adjust Indirect Fire	1	2	3	4
Employ a Three-Man Crew	1	2	3	4
Boresight a Caliber .50 M2 HB Machinegun on an M1 Tank	1	2	3	4
Supervise Before Operations Checks and Services on an M1 Tank	1	2	3	4
Prepare/Submit NBC-1 Report	1	2	3	4

Figure 5-1. Example First Page from Survey

(3) Develop Instructions. A cover sheet (see Figure 5-2) should present a brief explanation of purpose and importance of the survey followed by the rating instructions. In the present example, general instructions are presented on the cover sheet (Figure 5-2) with more specific instructions on the first page of the survey (Figure 5-1). Also, note that additional information concerning the SME's level of experience is obtained by items on the cover sheet.

TASK CRITICALITY SURVEY

Name _____ MOS _____
Last First M.I

Unit _____ Length of Service _____ _____
Years Months

Grade _____ TC Experience _____ _____
Years Months

BNCOC TASK SURVEY

The Human Resources Research Organization (HumRRO) and the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) are redesigning the 19K BNCOC Program of Instruction (POI). This survey presents lists of tank commander tasks, decisions, judgments, and interactions. In order to decide which of these activities will be trained in BNCOC, we need to know the importance of each one. We want you to rate the importance of these activities based on your knowledge of the tank commander's job. Please disregard whether or not these activities are currently in the BNCOC POI.

Your judgments will have a significant impact on the content of BNCOC. Please read all of the instructions thoroughly and take care in making your ratings.

Figure 5-2. Example Cover Sheet

b. Obtain Appropriate SMEs. In order to obtain valid ratings of task criticality, the SMEs must have had first-hand experience in performing the tasks. In other words, they should have been incumbents in the job in question long enough to have had some experience with all the tasks in the inventory. The sample of SMEs should be neither too small so that task ratings are unreliable, nor too large so that personnel costs associated with the survey exceed the relatively small gains in reliability. The sample size should probably be no smaller than 10 and no larger than 30.

c. Analyze Results. Assemble the completed surveys and take the following measures to analyze the results:

(1) Compile Data. Prepare a data sheet with individual tasks as rows and SME responses as columns. Figure 5-3 presents an example using a few tasks from 19K BNCOC. In this hypothetical situation, three SMEs (a, b, and c) have rated three tasks. Normally, more SMEs would be used to rate a larger selection of tasks. The numbers were kept small to simplify the arithmetic.

Tasks	Raters a	b	c	Average Rating	Relative Rank
Conduct Training	3	2	2	2.33	3
Call for and Adjust Indirect Fire	4	4	4	4.00	1
Employ a Three-Man Crew	4	3	3	3.33	2

Figure 5-3. Example Data Sheet for Compiling SME Ratings

(2) Compute Average Ratings. For each task, compute the average rating. Do this by adding all of the ratings for each task and dividing by the number or raters (SMEs). Each calculation should be carried out to three decimal places and rounded to two. The average ratings for the example tasks are shown in the next to last column of Figure 5-3.

(3) Rank the Tasks. Rank order the tasks from highest to lowest average rating. The ranking allows you to see relative position of tasks in terms of criticality. The task ranking should generally conform to your common sense notions of the relative importance of the tasks. The rank order of the example tasks is indicated in the last column of Figure 5-3. The number one (1) indicates that the task entitled "Call for and Adjust Indirect Fire" received the highest rating; the number two (2), the second highest rating; and so on.

5-3. Conduct Delphi Negotiation to Select Tasks. The SME ratings provide an important, but by no means, exclusive criterion for task selection. The task selection process should also be based on other factors such as training management considerations (e.g., training time, costs, and other resource issues), instructional considerations (e.g., task difficulty or instructional sequencing), and military considerations (e.g., the relationship of a task to the unit's mission). A panel of training experts should be convened to consider these issues and the SME ratings in order to select and prioritize tasks to be trained in the revised course.

a. Determine Partitioning Rules. After inspecting the task inventory, training management may have given you guidance as to what percentage of the tasks should be chosen for training. If their guidance is less explicit, devise your own partitioning rules. Partitioning rules refer to how the tasks will be divided to indicate which will be trained. The simplest rule is to have two categories: those tasks that will be trained and those that will not be trained. The recommended rule is to divide the task inventory into three parts. The procedure is described below:

(1) According to IPISD (TRADOC Pamphlet 350-30, Vol. 1, p. 143), the task inventory should be divided into three parts: the most important 60-65% of the tasks (referred to as "must train" tasks), the least important 15-20% of the tasks ("don't train" tasks), and the remaining 15-25% of the tasks that should be trained if time allows ("should train" tasks). The "should train" tasks are then prioritized from most to least important. This middle category allows the course contents to be systematically varied as time and resource constraints change.

(2) Do not be limited to the proportions suggested in IPISD if your situation demands otherwise. For instance, if you think that there will be enough time to train most of the tasks on the inventory, you may wish to make the least important category smaller. Or, if you need to provide training management more latitude in modifying course length, you may want to make the middle category larger. Take time to consider your situation and devise a reasonable method for partitioning the task inventory.

b. Obtain Task Selection Panel. As stated above, a wide range of factors should be considered in the task selection process. Consequently, the task selection panel should represent a diversity of backgrounds related to training. Appropriate experts include instructors in the present course, training analysts, training developers, etc. Training management may wish to participate or to assign a representative. To keep the negotiation manageable, no more than eight people should serve on the task selection panel. Furthermore, to lend greater objectivity to the process, you (the course developer/reviser) should not serve as a panel member and should act only as moderator of the task selection process.

c. Conduct Delphi Negotiation. Some members of the panel may be inhibited by face-to-face meetings because of differences in rank or because of a reluctance to speak in front of groups. As a consequence, an important source of expertise may be effectively lost to the group. To overcome this problem, the task selection panel will start the negotiation using an anonymous group problem solving method called the Delphi technique. The following negotiation procedures should be used to select tasks for training:

(1) Instruct Panelists. Give the panelists the results of the SME ratings to use in making their task selections. Explain that there will be several rounds of negotiation wherein panelists interact anonymously to achieve group consensus. For each round of negotiation, instruct panelists to divide the tasks according to the partitioning rules. That is, panelists should place so many tasks (exact number depends on the partitioning rules) in the "must train" category, so many tasks in the "don't train" category, and the rest in the "should train" category. Panelists should work independently and at their own rate. The moderator should try not to reveal the identify of the panelists to one another during the negotiation process.

(2) Feed Back Results. After each round of negotiation, you (the moderator) should prepare a report on the results. An example report is shown in Figure 5-4. The report should have the following features:

(a) Response Frequencies. Count how many panelists responded to either "must train," "should train," or "don't train" to each task. The frequency of responses to each task should sum to the total number of panelists. In the example report (Figure 5-4), it can be seen that a total of five panelists have divided the three tasks that were previously rated by SMEs (Figure 5-3).

	Frequencies			
Task	Must Train	Should Train	Don't Train	Comments
Conduct Training	0	3	2	
Call for and Adjust Indirect Fire	2	3	0	
Employ a Three-Man Crew	(1)	3	1	Combat will probably require employment of three-man crews; TCs are currently not trained on the task.

Figure 5-4. Example Feedback Report

(b) Minority Opinions. Indicate whenever a panelist is in the minority of opinion by circling the category in which his or her response fell. A minority response is where a panelist gives the least frequently chosen response category for a given task. In the example individual feedback report (Figure 5-4), the "must train" alternative is circled indicating that the hypothetical panelist was the only one who classified the task entitled "Employ a Three-Man Crew" as a "must train" item. Minority responses can be seen for the other two tasks as well as for the one panelist who classified the three-man crew task as a "don't train" item. The fact that other categories are not circled for the other two tasks indicates that the hypothetical panelist responded with the majority in those cases. Whenever a minority response is so identified, the panelist is instructed to either change his or her response on the next round of negotiation or to defend his or her response in writing.

(c) Comments. If a panelist refuses to change a minority opinion and submits a written reason for not changing his response, his reasoning is briefly summarized in the comments column of the feedback report and subsequently circulated to the other panelists along with the results of the next round of negotiation.

(3) Restrict Responses. In order to maintain the proportions of tasks within categories, any change in the response to a task in a particular category must be compensated by a change in classification of a task in another category. In order to prevent wholesale changes in responses and to promote group consensus, panelists should not be allowed to change their response to tasks that have been "frozen" into a particular category. Frozen tasks are those whose category was unanimously agreed upon in a previous round. This restriction in responding has the effect of eliminating frozen tasks from consideration and focusing the group's attention on tasks on which they disagree.

d. Resolve Remaining Differences. Over the course of 3-7 rounds of negotiation (depending on the size of the task inventory), the task selection panel will come to a relatively quick consensus for most (80-90%) of the tasks. There probably will be, however, some panel members who refuse to change their mind about particular tasks even if they are in the minority. Instead of continuing the Delphi indefinitely, there are two measures you can take to resolve the remaining differences between panel members:

(1) Convene a Face-to-Face Meeting. The first measure is to convene a face-to-face meeting of panelists. The purpose of this meeting is for the panelists holding minority opinions to more fully explain their reasons for their responses and for others to react to those reasons. As moderator of this meeting, you should insure that discussion only concern the tasks about which the panelists disagree. Hopefully, all differences can be resolved in this meeting. If the panel does not resolve all disagreements, you need to take the following measure.

(2) Make Decision. For the remaining tasks, you should consider all the arguments presented and make an appropriate decision. Your judgment should be based on the content of panelists' arguments and not on how well the arguments are presented. If plausible arguments are presented on both sides of an issue, you should go with the majority opinion. Organize the task inventory into a proposed "must," "should," and "don't" train categories and submit to the panel for their approval and comments.

e. Prioritize Tasks in the "Should Train" Category. There are at least three methods for prioritizing tasks in the "should train" category from the most to the least important:

(1) Panelists Rank Tasks. If task selection comes to a fairly quick conclusion, you can ask the panelists to prioritize the tasks from most to least important for training purposes. Because ranking requires a great many comparative judgments between tasks, this procedure should only be used when there are not many tasks (less than 15) in the "should train" category. Also, panelists are not likely to unanimously agree on task rankings. You either have to devise a method for combining group opinion (e.g., taking the average rank for each task) or engage in another negotiation to obtain a group consensus.

(2) Use SME Ratings. A much easier method of prioritizing tasks is to rank tasks on the basis of average ratings assigned tasks by the SMEs in the first phase of task selection. As argued earlier, however, the SMEs may not be sensitive to training considerations.

(3) Use Results from Negotiation. The recommended method of prioritizing tasks is to use the responses of the task selection panel. The panelists have, in effect, repeatedly rated the tasks throughout the task selection process. Use the following procedures to convert the panel's responses to relative priorities among the "should train" items:

(a) Quantify Responses. To quantify their responses, assign the "don't train," "should train," and "must train" responses numerical values of one, two, and three points respectively. For each round, multiply the point values of each response by the number of panelists giving that particular response. The example in Figure 5-5 is taken from the results reported in the previous figure (5-4). On this single round of negotiation, tasks are then prioritized as shown in the last column of the Figure.

(b) Combine Results from All Rounds. To combine the results from all rounds, you can simply sum the points across rounds. However, this procedure weights the results from each round equally. The later rounds are more important because they more fairly represent the group's convergence of opinion. An alternative procedure is to rank the tasks on the basis of the last round. Ties are to be expected since most panelists respond "should train" by the end of negotiations. Ties can be resolved by the number of points the tasks received in the next previous round, and so forth until all ties are resolved.

5-4. Prepare Report on Results. Prepare a report on the task selection process for training management. The report should contain both the method and the results of this phase in course revision. The report should be labeled for information purposes only since comments or approval are not required at this point in the revision process.

	Response Category				
	Must Train	Should Train	Don't Train	Total Points	Relative Priority
Conduct Training	(0x3)	+ (3x2)	+ (2x1) =	8	3
Call for and Adjust Indirect Fire	(2x3)	+ (3x2)	+ (0x1) =	12	1
Employ a Three-Man Crew	(1x3)	+ (3x2)	+ (1x1) =	10	2

Figure 5-5. Recommended Method of Prioritization

CHAPTER 6

REVISE/DEVELOP TRAINING OBJECTIVES

6-1. Introduction. Training objectives must now be developed for each task selected for training.

a. Training objectives are sometimes referred to as "terminal" objectives because they describe the final behaviors that students are supposed to acquire as a result of instruction. These terminal objectives represent the second level in a hierarchy of course objectives. That is, training objectives are subordinate to the overall course objective. Training objectives may also be broken down into subcomponents called "enabling" objectives. These enabling objectives are identifiable subobjectives that must be attained in order to attain the training objective. The individual performance elements are the lowest level of analysis and usually represent an observable task action or step.

b. Training objectives have already been developed for the tasks that are in the current POI (referred to as "old" tasks). The training objectives for each of the old tasks should be systematically examined and modified as required. For tasks that are not already in the current POI or those that are substantially modified (i.e., the "new" tasks), training objectives must be developed anew. These two processes are described in separate sections below.

6-2. Revise Objectives of Old Tasks. Training objectives are derived from detailed analyses of tasks into enabling objectives and performance elements. Unfortunately, it is sometimes difficult to obtain the original documentation for these analyses. However, the final product of task analysis (i.e., the training objectives themselves) can be found in multiple sources.

a. Obtain Statements of Objectives. There are several sources from which you can obtain statements of training objectives:

(1) Program of Instruction. A statement of each training objective in the existing course can be obtained from the POI.

(2) Lesson Plans. Training objectives can also be found at the beginning of the appropriate lesson plan for the existing course.

(3) Soldier's Manuals. All procedural tasks should be described in either the Soldier's Manual for the MOS or the Soldier's Manual of Common Tasks.

b. Identify Structural Components. Training objectives consist of three structural components:

(1) Actions: Behavior(s) required to execute a particular task.

(2) Conditions: Important aspects of the environment that are present during task performance.

(3) Standards: Criteria of performance that must be attained in order to successfully execute the task.

c. Review for Consistency. The actions, conditions, and standards as stated in the POI and in the Lesson Plans should be in total agreement for each training objective. Note wherever they in fact disagree. These discrepancies must be resolved before proceeding with development of the revised course. Many of the discrepancies are easily resolved. Others may require you to go to some authoritative source such as the Soldier's Manual or SMEs. Be cautioned, especially for common tasks, that the Soldier's Manual task statement may be significantly different from the statement for the corresponding task which has been tailored to a particular course. To take an example from 19K BNCOC, the task entitled "Navigate from One Point on the Ground to Another" requires the soldier to navigate over a distance of 5,000 meters whereas the Soldier's Manual task requires only a distance of 3,000 meters. The difference is that the former (armor) task assumes that the soldier is in a tank and the latter task (evidently developed for infantry) assumes the soldier does not have a vehicle. Such discrepancies between tasks as stated in the Soldier's Manual and those in the existing course are perfectly reasonable and, therefore, tolerable.

d. Review for Adequacy. Once you have obtained consistent statements of training objectives, you should evaluate their adequacy using the following criteria (taken from TRADOC Pamphlet 350-30, Volume II, p. 8-9):

(1) Objectives must be a statement of student behaviors (actions), such as the creation of a product or some other overt act, which can be accepted as evidence that the intended outcome has occurred.

(2) The behavior must describe specifically all steps and outcomes that will demonstrate that learning has occurred.

(3) The student behavior called for must be capable of observation and evaluation within the learning and testing environments.

(4) The objective must be stated in learner rather than teacher terms, i.e., actions which the student will perform rather than what the teacher will say or do.

(5) There must be a standard against which the student behavior will be measured. It must be fully specified.

(6) The statement of the conditions under which the student will occur must be fully specified.

e. Revise Objective as Appropriate. Any changes identified as appropriate in your review should be incorporated into the training objectives.

6-3 Develop Objectives for New Tasks.

a. Task Vs. Learning Analyses. You must develop training objectives for the new tasks introduced to the task list and for the tasks that were substantially modified. According to SAT, training objectives are developed from a learning analysis of the tasks. The learning analysis, in turn, is derived from a task analysis. Both the task and learning analyses detail the conditions, actions, and standards of task performance along with the important skills and knowledges one must possess to perform the task. The critical difference between the two analyses is that the task analysis is stated from the point of view of the job, whereas the learning analysis takes the constraints of the training environment into account. The purpose of the learning analysis is to act as a "bridge" between actually performing the task and learning how to perform the task (Vineberg & Joyner, 1980). In practice, however, the two types of analyses are very similar. The detailed description of conditions, actions, standards, skills, and knowledges represents a good deal of effort and should not be duplicated over different forms. In addition, differences between performance on the job and performance during training should be highlighted instead of obscured in the details of the two analyses. For these reasons, the task and learning analyses should be combined into one analysis and any crucial differences between performing and learning a task should be noted in the analysis itself.

b. Combined Analysis. In addition to detailing the task data discussed above, task and learning analyses also provide other types of information. Both task and learning analyses provide basic task documentation information such as task title, task number, and the references used for the analysis. In addition, the task analysis provides important information on the job context of task performance such as equipment required, personnel required, and unique working conditions that affects task performance. On the other hand, the learning analysis also provides information which training materials developers will need such as recommended training activities, recommended media, and estimates of the time required to train the task. The combined task/learning analysis should include all of this additional information.

c. Example. To illustrate how a combined task/learning analysis may be performed, a sample analysis worksheet is shown in Figure 6-1 at the end of the chapter. Many of the items were modified from the task analysis worksheets and the learning analysis worksheets presented in the Training Development Handbook (Draft document, USAARMC, 1980). The example task entitled "Prepare and Issue Oral Operation Orders" is a revised task which was suggested for inclusion in 19K BNCOC (Morrison, Drucker, & O'Brien, 1985). Currently regarded as a platoon sergeant task, the course revisers proposed that the task be modified to be relevant to tank commander orders to his crew. Each of the 18 items of

the analysis are explained below in the order in which they appear in the example analysis at the end of the chapter.

(1) Task Documentation Data. The first group of items are essential for documenting the analysis.

(a) Date of Analysis. Record the date that the analysis is finished.

(b) MOS with Skill Level. This item should be self-explanatory.

(c) Title. Record the title that you propose to give the task. If the task represents a modification of an existing task, list the previous title in parentheses.

(d) Task Number. Record the task number (or numbers if a modified task is a combination of tasks) of the task being modified.

(e) References. State every reference you used to perform the analysis. The reference should provide enough information for others to identify and locate the source. This information will be particularly useful to those who will be developing new training materials.

(2) Conditions. The second group of items detail the conditions under which the task is performed.

(a) Task Setting. Describe the setting and general conditions surrounding task performance.

(b) Supplies, Tools, and Equipment. List all pieces of hardware that are needed to perform the task.

(c) Job Aids, Manuals, or Data. List all documents that a job incumbent has available to him and to which he can refer during task performance. Examples include technical manuals, checklists, GTA cards, etc.

(d) Personnel. Identify the following personnel who are involved in task performance:

1 the job title of the person who actually performs the task being analyzed,

2 the job title(s) of anyone who assists in performance of the task in question, and

3 anyone who assigns the task to the jobholder, who supervises the process, or who approves the final product of the task.

(e) Unique Working Conditions. List any unique working conditions that might affect task performance. The key word to this element is "unique." Unique conditions include unusual physical requirements (e.g., 20-20 vision) or restrictive working conditions (e.g., cramped position).

(f) Job Conditions Not Replicable for Training. Describe any condition that cannot be created for training because of safety reasons, cost considerations, or any other reason.

(3) Initiating Cues. Identify the cues that signal the job incumbent to execute the task. Every task has one or more initiating cues that may come from a variety of internal or external sources.

(4) Standards. Specify how well the task must be performed. Standards of performance can describe the adequacy of the task product, the speed and accuracy of task performance, or both whenever appropriate. If the training objective is broken down into multiple enabling objectives, list the performance standards for each separately.

(a) On the Job. Determine the standards for performance on the job. You can sometimes derive performance standards from doctrine or from technical manuals. If such information cannot be found, consult an SME in order to determine an appropriate standard.

(b) During Training. Determine whether or not training standards should differ from job standards. Training standards may differ from job standards for a variety of reasons. For instance, training standards may be less than job standards because time, cost, or safety considerations do not allow enough practice on the task to attain job standards. Presumably, additional on-the-job training would be prescribed in this case to bring the job incumbent up to standards. Alternatively, training standards may be greater than job standards if on-the-job training is impractical and if rapid skill degradation is expected. However, in most cases, it is desirable for training standards to match job standards.

(5) Actions. To describe the action component of the training objective, the behaviors are broken down into separate elements. Skills/knowledges and notes are listed alongside the appropriate task element.

(a) Elements. List all the steps the job incumbent has to perform in executing the task. If the objective can be broken down into enabling objectives, use an outline form to show the hierarchical structure. That is, use arabic numerals (1, 2, 3 . . .) to indicate enabling objectives and letters (a, b, c . . .) for the performance elements.

(b) Skills and Knowledges. Skills and knowledges refer to the so-called "mental" aspects of task performance. Identify these components and locate them beside the appropriate task elements. Instruction may or may not be developed for each skill/knowledge

component depending on your best estimate of whether or not students possess those components upon entering the course (see Chapter 3).

(c) Notes. In this column, provide any important information that does not fit into any other category. This sort of information might include: points that need further clarification, how the corresponding training element may differ from the job element; etc.

(6) Training Requirements. In this section, the analyst provides information that can be used to estimate the training requirements of the task. It should be emphasized the following information is really nothing more than an estimate of the training requirements proposed in a relatively early stage of course revision.

(a) Learning Activities. Briefly outline suggested learning activities for attaining the training objective. The ISD procedures provide guidelines for choosing appropriate learning activities. However, the guidelines are based on a taxonomy of learning objectives that is not universally accepted among instructional developers. The specification of learning activities is usually left to those who write lesson plans. Thus, this item should be the analyst's best guess which is regarded as only a suggestion to those developing the training materials.

(b) Media/Equipment. Estimate the types of equipment needed to support the learning activities. Be sure to include special training devices or media that may be applicable to training the task. Like the previous entry (learning activities), this entry should only be regarded as a suggestion to the training developer. Nevertheless, two publications that relate to this issue may help make your suggestions more informed:

1 If one of the primary reasons for revising the course is to incorporate new training technologies, you should construct an inventory of applicable technologies and identify the tasks to which they apply. Such an analysis was conducted for 19K BNCOC as described in Part II of Drucker, Hannaman, Melching, and O'Brien (1984). By example, this report provides possible information sources and methods for this sort of analysis.

2 The Army Research Institute has published a guidebook for selecting appropriate training media (Reiser, Gage, Wager, Larsen, Hewlett, Noel, Winner, & Fagan, 1981). The guide provides some useful insights in the process of media selection. However, like the procedures for prescribing learning activities, the media selection process is based on the same sort of learning taxonomy that is not universally accepted.

(c) Personnel. List the number of instructors, assistant instructors, controllers, and any other personnel that you think will be needed to carry out the instruction.

(d) Time. Estimate the time required to train the task. If possible, break the time down into that required for initial classroom instruction and that required for any practical exercises.

(7) Statement of the Training Objective. Using the criteria for evaluating objectives (para 6-2d above) and the information from this analysis, state the training objective in paragraph form. Be sure to include clear statements of task actions, conditions, and standards. Use the acceptable training objectives for old tasks as models.

(8) Evaluation Criteria. Determine exactly what performance criteria will be used as evidence that the training objective has been attained. As above, be sure to state the criteria in terms of task actions, conditions, and standards. The difference between the last two elements is that the former constitutes guidance for training development, whereas the latter relates to test development. Ideally the training objective and the evaluation criteria will be identical. However, because of time and resource constraints in the testing situation, they may differ.[1]

[1]The apparent differences between the training objective and the evaluation criteria for the present example task are discussed in Chapter 8.

ANALYSIS WORKSHEET

1. TASK DOCUMENTATION DATA

   a. DATE OF ANALYSIS: 7 February 1985
   b. MOS WITH SKILL LEVEL: 19K30 (4X)
   c. TITLE (PREVIOUS TITLE IF APPLICABLE): Prepare and Issue an Oral Operation Order
   d. TASK NUMBER: 071-326-5626
   e. REFERENCES: FM 17-15(T), FM 17-19K4, Division 86 Tank Platoon SOP, HumRRO Interim Report entitled "Design of the Basic Noncommissioned Officer Course for M1 Tank Commanders" (November 1984)

2. CONDITIONS

   a. TASK SETTING: In an assembly area awaiting orders concerning future operations.
   b. SUPPLIES, TOOLS, AND EQUIPMENT: Notebook, pencil, and map of area
   c. JOB AIDS, MANUALS, AND DATA: None
   d. PERSONNEL:
      (1) PERFORMED BY: Tank Commander (TC)
      (2) ASSISTED BY: Crew
      (3) SUPERVISED BY: Platoon Leader (PL)
   e. UNIQUE WORKING CONDITIONS: None
   f. CONDITIONS THAT CANNOT BE REPLICATED IN TRAINING: None

3. INITIATING CUES: Receipt of a PL's warning order to standby for an oral operation order

4. STANDARDS

   a. ON THE JOB: The TC must know the organization and contents of an operation order (OPORD) so that he is able to:
      (1) understand the platoon OPORD in order to extract information relevant to crew operations,
      (2) develop a crew OPORD that follows the standard five-paragraph format, and
      (3) issue the crew OPORD within 10 minutes after receiving the platoon OPORD.
   b. DURING TRAINING: Same as above.

Figure 6-1. Example Task/Learning Analysis

5. ACTIONS

a. ELEMENTS	b. SKILLS AND KNOWLEDGES	c. NOTES
1. Explain the organization and contents of the operation order (OPORD).	Know the headings and the sequence of the first major paragraphs (and subparagraphs) in an OPORD are: Situation (Enemy Forces, Friendly Forces, Attachments and Detachments); Mission; Execution (Scheme of Maneuver, Fire Support, Specific Instructions, Coordinating Instructions); Service Support (Trains and Supply Points, Supply, Maintenance and Evacuation, and Personnel); and Signal (Signal and Command).	NOTE: Service support requirements at crew level should be covered by SOP.
2. Determine from the platoon OPORD what your crew must accomplish during the mission.		
a. Explain your mission.	Know that your mission is to maintain position in various movement and reaction formations, to respond to all PL/PS orders, to destroy enemy targets as acquired, and to submit appropriate reports.	NOTE: The mission of a tank crew, operating within the normal context of platoon operations is normally the same for each tactical operation. The exception is a specific mission for a specific crew not covered by the unit tactical SOP.
b. Explain the enemy situation.	Know that the best description of the enemy situation includes where they are located, their strength, and their weapons. Know to include any known modes of enemy operation that might be useful.	
c. Explain the terrain conditions area of operations.	Know that proper use of terrain will provide cover concealment, increase the effectiveness of fire, and decrease the effectiveness of enemy fire.	

Figure 6-1. Example Task/Learning Analysis (Continued)

a. ELEMENTS	b. SKILLS AND KNOWLEDGES	c. NOTES
d. Explain the predicted weather conditions in the area of operations.	Know that weather may have adverse effect on men if not properly prepared.	
e. Explain what supplies and equipment will be needed for operation.		
f. Explain special tasks for crew.		
g. Determine when operations begin and what time crew must be ready to go.		
h. Develop a reverse planning sequence schedule.		
(1) Identify things that must be done.		
(2) Work backwards from "ready" time to assure that men accomplish things.		
i. Conduct a map reconnaissance of route of advance.	Know that map reconnaissance includes identification route of advance, obstacles along the route, ambush sites along the route, prominent elevation points along the route, and areas along the route with fields of fire of 2000-3000 meters.	

Figure 6-1. Example Task/Learning Analysis (Continued)

a. ELEMENTS	b. SKILLS AND KNOWLEDGES	c. NOTES
3. Develop a crew OPORD.		
a. Write statement of situation (para 1).		
(1) Include information on enemy forces (para 1a).	Know to include any available information such as strengths, weaknesses, probable courses of action, weather, and terrain.	
(2) Include information on friendly forces (para 1b).	Know to include any available information concerning missions of next higher and adjacent forces.	
(3) Include information on attachments and detachments (para 1c).	Know to include information concerning units that have been attached to or detached from the platoon.	
b. Write statement of mission (para 2).	Know standard tank crew mission or any specific missions required in present operations.	
c. Write statement of how mission will be accomplished (para 3).		
(1) Include information on the scheme of maneuver (para 3a).		
(2) Include information on fire support (para 3b).		
(3) Include specific instructions for the crew (para 3c).		
(4) Include coordinating instructions (para 3d).		

Figure 6-1. Example Task/Learning Analysis (Continued)

a. ELEMENTS	b. SKILLS AND KNOWLEDGES	c. NOTES
d. Write details of service support (para 4).	Know details include ammunition supply, ration resupply, and the evacuation of casualties.	
e. Write statement concerning command and signal (para 5).		
(1) Include instructions on communications (para 5).		
(2) Include instructions on succession of command (para 5b).		

6. TRAINING REQUIREMENTS

a. LEARNING ACTIVITIES: Instruction should begin with a lecture on the content and organization of an OPORD. The next part should include instructions on how a platoon OPORD is translated to a crew OPORD: Finally, soldiers practice task by listening to example platoon OPORDS and developing appropriate crew OPORDS in writing. Practice may include the oral delivery of crew OPORDS as well.

b. MEDIA/EQUIPMENT: Lectures will require an overhead projector and a series of prepared overlays on the content and organization of OPORDS. Pencils, pocket-sized notebooks, and maps will be supplied to the students.

c. PERSONNEL: One primary and one assistant instructor will be required. The primary instructor is responsible for delivery of lecture. Both instructors will provide guidance and feedback during practice.

d. TIME: Four hours of instruction including two for lecture and two for practical exercises.

7. TRAINING OBJECTIVE: Given a pencil, notebook, appropriate maps, and a warning order to standby for an order; the tank commander must analyze a platoon leader's operation order, write out an appropriate and accurate crew operation order, and deliver it to his crew within 15 minutes of receiving the platoon leader's orders.

8. EVALUATION CRITERIA: Given a pencil, notebook, appropriate maps, and a recorded platoon leader's orders; the tank commander must write out an appropriate and accurate operation order within 15 minutes of receiving the platoon leader's orders.

Figure 6-1. Example Task/Learning Analysis (Continued)

CHAPTER 7

ORGANIZE TRAINING OBJECTIVES

7-1. Introduction.

a. Now that the training objectives have been developed, you must structure and sequence them in some meaningful way. The purpose of this phase of course revision is to do just that, i.e., to organize the training objectives into manageable blocks of instruction. This organization has at least three positive effects on training effectiveness:

(1) First, the proper organization of course objectives enhances trainee performance by maximizing the transfer of skills and knowledges from one subject area to another and by the increased meaningfulness provided by course structure.

(2) Second, it also increases the efficiency of course administration by eliminating duplication in instruction and by making effective use of training facilities and equipment.

(3) Third, the proper organization of training objectives facilitates course development by dividing the course into meaningful units that can be developed independently of other units.

b. According to IPISD procedures, the proper sequencing and clustering of training objectives is determined by an analysis of the relationships between objectives. For instance, objectives might be related by virtue of the fact that one is a prerequisite to the other (called a dependent relationship) or that two objectives are performed in close temporal proximity on the job (a so-called supportive relationship). In practice, such an analysis may be an unrealistic requirement. For instance, for a relatively short list of 50 training objectives, there are over 1000 possible relationships between tasks. Furthermore, Vineberg and Joyner (1980) criticized the decisions rules for structuring and sequencing on the basis of these relationships. They argued that the decision rules are often incomplete and, in some cases, conflicting. Results from their field study of training projects indicated that training developers did not analyze all task interrelationships to actually sequence and cluster objectives. Instead, the organization of objectives was primarily determined by the availability of training facilities and equipment.

c. To develop a more practicable procedure for organizing training objectives, it should first be recognized that there is considerable inherent structure in the course, especially by the time you have gotten this far in the process of course revision. At the lower level of organization, the previous analysis of the various task components (subtasks and individual elements) provides structure and sequence to instruction within an individual training objective. At a higher structural level, the tasks have already been divided into functional areas. The proposed procedure is designed to utilize the existing structure and create a level of organization that is midway between those extremes.

That is, it will indicate which objectives need to be combined to create logical blocks of instruction.

7-2. Determine Method for Sorting Objectives. Because there are no hard and fast rules for clustering and sequencing objectives, there are numerous ways that objectives can be reasonably organized. You must be able to try out several alternative organizations and then judge for yourself which is the best organization. Consequently, you will need an efficient method for sorting and resorting objectives. The suggested method is to write the task title corresponding to each training objectives on separate index cards. Cards can be shuffled and reshuffled into various orders. Clusters of objectives can be indicated by paper clipping two or more cards together.

7-3. Establish Functional Categories. Part of the problem with the IPISD procedure for sequencing and clustering objectives is that training developers must consider all the objectives at once. If done in this manner, the procedure for clustering and sequencing can exceed the limits of human information processing. It is far easier to work within smaller categories of objectives. This strategy lessens the cognitive workload by reducing the number of items that the developer needs to consider at once. The homogeneity of the groups also makes it easier to spot commonalities across objectives

a. Review Existing Categories. Functional categories were established during the revision of the task list. These categories must be reviewed to see if they make sense for training. Using a 19K BNCOC example, "Prepare a Sketch Range Card" was initially identified as a gunnery task since it related to indirect firing techniques. However, training the task would not, and probably should not, require live firing that is central to gunnery training. The other consideration was that this task is also related to preparing defensive positions, which is typically regarded as a tactical topic. Consequently, the task was moved to the tactics category for training purposes.

b. Sort Objectives into Categories. Using your method for sorting, place each objective into one and only one category. The following example from 19K BNCOC is the category of tactics. The 12 objectives (tasks) in this category include:

(1) Call For and Adjust Indirect Fire

(2) Direct Evasion of an Enemy Anti-Tank Guided Missile

(3) Estimate Range

(4) Conduct Target Acquisition

(5) Direct Reorganization on the Objective

(6) Select a Firing Position

(7) Prepare a Sketch Range Card

(8) Prepare and Issued an Oral Operation Order

(9) Prepare a Situation Report (SITREP)

(10) Conduct a Tactical Road March

(11) Maintain Position in Platoon Formation

(12) Prepare and Submit a Standard Shelling, Mortaring and Bombing Report

7-4. Cluster/Sequence Objectives Within Categories. Now that the objectives are divided into manageable groups, organize the objectives within each of the functional categories. The following instructions imply that one should cluster the objectives first and then sequence. In actuality, the process is much more interactive. New ways to sequence will lead to different clustering and vice versa.

a. Cluster Objectives. There are at least two degrees of relationship between objectives which may be identified:

(1) First Order Relationships. These refer to training objectives that are so closely related that they should be trained in the same block of instruction. Possible first order relationships include those where one objective is a prerequisite to another; one objective is a part (i.e., a subobjective) of another; or the objectives share many of the same attributes, e.g., the conditions, actions, standards, etc. Because first order clusters form single blocks of instruction, they must be given a name which is descriptive of the overall objective. Four first order relationships can be identified in the 19K BNCOC example of tasks in the functional area of Tactics:

(a) Three of the objectives involve the preparation of orders and reports: "Prepare and Issue an Oral Operation Order"; "Prepare a Situation Report (SITREP)"; and "Prepare and Submit a Standard Shelling, Mortaring, and Bombing Report." Positive transfer would result from having these tasks trained in close proximity. On the other hand, negative interference between similar objectives may also occur. Instruction should be designed to minimize the detrimental effects of interference. For instance, the developer should allow for practice on distinguishing the reports. The suggested cluster name is "Prepare Orders and Reports."

(b) Two tasks deal with tactical movements with the tank: "Conduct a Tactical Road March" and "Maintain Position in Platoon Formation." Though not a formal subtask, "maintaining position" may be considered as part of a tactical road march. These objectives should be trained together in a cluster named "Participate in Coordinated Platoon Movement."

(c) Similar to the previous example, "Estimate Range" is part of the objective entitled "Conduct Target Acquisition." Because the first is subordinate to the second objective, the cluster should also be named "Conduct Target Acquisition."

(d) "Select a Firing Position" and "Prepare a Sketch Range Card" are related because they are both components of preparing a defensive position. Hence, the corresponding cluster should be named "Prepare Defensive Positions."

(2) Second Order Relationships. Second order relationships include objectives that are similar at least in superficial aspects, but not similar enough to be clustered within the same block of instruction. Objectives having a second order relationship should nevertheless be placed close together in the course to maximize skill transfer. If the objectives share similar conditions, they will likely require similar training equipment and facilities. Two examples of these relationships can be drawn from 19K BNCOC:

(a) "Direct Evasion of an Enemy Anti-Tank Guided Missile" is related to the two movement tasks in the cluster entitled "Participate in Coordinated Platoon Movement." Even though the task involves neither tactical nor coordinated movement per se, it should be placed close to the other two tasks because training on both tasks requires either a moving tank or training equipment that simulates movement.

(b) "Call For and Adjust Indirect Fire" shares task components with "Estimate Range" and "Conduct Target Acquisition." All three should be in close proximity, but the indirect fire task deserves a separate block of instruction because of its complexity.

b. Sequence Objectives. After potential clusters have been identified, objectives are then sequenced both within and among the clusters.

(1) Within Clusters. There are many ways that objectives within clusters may be sequenced. The following suggested rules for sequencing were taken from the Training Development Handbook (Draft document, US Army Armor School, 1980, p. 2-22):

(a) Job Performance Order. Objectives should be trained in the same order that they are performed on the job. Using the "Prepare Defensive Position" as an example, the objective of "Select a Firing Position" should be trained before "Preparing a Sketch Range Card" because a tank must first be in a firing position before a crewman is able to sketch a range card.

(b) Chronological Order. Similar to but more general than the previous guideline, this rule states that objectives corresponding to certain events should be trained in the same order as they occur. In the "Prepare Orders and Reports" cluster, the suggested order of objectives ("Prepare and Issue an Oral Operation Order"; "Prepare a Situation Report (SITREP)"; and "Prepare and Submit a Standard Shelling, Mortaring, and Bombing Report") corresponds to events that generally occur before, during and after battle. Similarly, within the cluster entitled "Participate in Coordinated Platoon Formation," the task entitled "Maintain Position in Platoon Formation" occurs after platoon movement has been initiated. Thus, it should be trained after "Conduct Tactical Road March," which provides for initiating the movement.

(c) Cause and Effect. Instruction on the causes of an event should precede a description of the effects of an event. This rule would appear to apply to sequencing elements within knowledge oriented objectives. The example taken from the Armor School's handbook is that an explanation of the causes of unit morale problems should be presented prior to a description of the effects of the problem on unit performance.

(d) Critical Sequence. Any critical sequence in a procedure must be trained in the order the sequence occurs. As in the previous guideline, this rule appears to apply to sequencing the elements within training objectives. For instance, in order to charge a machinegun, the safety must be off before pulling the bolt to the rear in order to prevent damage to the gun. Thus, students must first receive training on putting the safety in the FIRE position prior to being trained to pull the bolt to the rear.

(e) Simple to Complex. According to this guideline, simple objectives should be trained prior to complex ones. Using the 19K BNCOC example, the relatively simple task entitled "Estimate Range" should be trained before the more complex task called "Conduct Target Acquisition."

(f) Known to Unknown. Familiar topics should be handled before unfamiliar ones. Again using the 19K BNCOC example, the tank commander trainees should be very familiar with the task entitled "Conduct Target Acquisition," at least from the gunner's point of view. However, they probably have had little or no experience on the related task termed "Call For and Adjust Indirect Fire." Thus, the former should precede the latter.

(2) Among Clusters. The clusters themselves must now be sequenced. The result of this step is that the order of objectives within a functional category should be completely resolved. The rules for sequencing within cluster apply also to sequencing among clusters. An additional guideline that can be used for sequencing among clusters is to follow a tactical scenario. This rule is used to sequence the tactical objectives in the 19K BNCOC example. The scenario starts with preparation to move out. During movement, the tank encounters enemy targets in the process of obtaining an objective. As a result of battle, the tank commander has to reorganize his crew and equipment. Finally, the tank commander secures the objective by preparing a defensive position. Following this scenario, the clusters and objectives in the tactical functional area are sequenced as follows:

(a) Prepare Orders and Reports:

1 Prepare and Issue an Oral Operation Order

2 Prepare a Situation Report (SITREP)

3 Prepare and Submit a Standard Shelling Mortaring, and Bombing Report

(b) Participate in Coordinated Platoon Movement

1 Conduct a Tactical Road March

2 Maintain Position in Platoon Formation

(c) Direct Evasion of an Enemy Anti-Tank Guided Missile

(d) Conduct Target Acquisition

1 Estimate Range

2 Conduct Target Acquisition

(e) Call For and Adjust Indirect Fire

(f) Direct Reorganization on the Objective

(g) Prepare Defensive Position

1 Select a Firing Position

2 Prepare a Sketch Range Card

c. Verify Organization within Categories. As Vineberg and Joyner (1980) point out, the various rules used for clustering and sequencing are incomplete, and in some cases, in conflict with one another. Consequently, there is no one single best organization of objectives within categories. The problem is particularly acute if you know very little about the category in question. If you are unsure about your organization of the objectives within a category, have a few SMEs go through the same exercise as you did. You should furnish them the cards you used and the guidelines for organizing objectives, but do not influence them in any other way. If you have more than one SME doing this procedure, be sure they work independently. You will most likely find that SMEs will agree on certain segments of the course and disagree on others. Your final arrangement should reflect your own evaluation of SMEs' responses as well as majority opinion on how objectives should be organized. Even though a majority of SMEs may arrange objectives a certain way, you may wish to follow the arrangement of a single SME who provides a convincing rationale for his particular arrangement.

7-5. Sequence Functional Areas.

a. After the objectives have been sequenced within each functional area, you must sequence the functional areas themselves. Again, the rules and guidelines for sequencing may apply to sequencing functional areas. However, at this level of organization, an additional guideline for sequencing, called the "Crawl-Walk- Run" principle, may come into play. This principle asserts that in order to learn how to run, first you have to learn how to crawl, and then to walk. In other words, instruction should be sequenced so that the student starts in simple learning situations that are contrived to allow him/her to acquire some of the most basic skills. Instruction then proceeds to ever-increasing levels of skill integration and task realism.

b. The crawl-walk-run principle was applied to 19K BNCOC. The revised course can be conceived as consisting of three parts.

(1) In the first part, the most abstract functional areas are presented primarily in a classroom environment. The functional areas (in sequence) are:

(a) Leadership and

(b) Training.

(2) The second part presents content areas that are related but not necessarily unique to armor. Instruction is a combination of classroom and field work. The functional areas in the second part are:

(a) Nuclear, Biological, and Chemical Defense;

(b) Mine Warfare;

(c) Communications; and

(d) Land Navigation.

(3) The third part is armor-specific and involves a lot of on-tank work: Maintenance, Gunnery, and Tactics. It is significant to note that the subject of Gunnery occurs before Tactics, which is in contrast to the sequence in the existing course. The rationale for this sequence in the revised course was that the subject of Tactics integrates all of the functional areas and should therefore be placed last in the sequence. The proposed order for the last part of the course is:

(a) Maintenance,

(b) Tank Gunnery, and

(c) Tactical.

CHAPTER 8

DEVELOP TESTS

8-1. Introduction.

a. There are two reasons for developing tests at this point in the course revision process. The first is that tests must be developed prior to developing instruction. According to the logic of ISD models, tests are developed from training objectives (as opposed to being developed from instructional content) because they are intended to measure student performance on those objectives. In addition, having completed tests prior to the development of training helps to ensure that the course reviser develops instruction that pertains to the training objectives and not to extraneous instructional material.

b. The second reason for placing test development at this point is that tests must be developed after training objectives have been clustered and sequenced. This allows tests to be developed on the basis of meaningful blocks of instruction and not individual objectives. If clustering and sequencing were to occur after test development, the tests would most likely have to be reorganized to correspond with the organization of instruction.

8-2. Review Tests for Old Tasks.

a. Secure tests for tasks that are in the present POI. You may have to make some minor changes in organization if the tasks are not clustered the same as in the proposed course revision.

b. Tests should be reviewed and revised in response to two general questions:

(1) What is the correct mode for testing the objective? This issue is discussed in detail below (para 8-3a).

(2) Does the test provide an accurate measure of whether or not a student has attained the objective? Another way to phrase this question is can you predict, from test performance, whether or not the student can actually perform the task in question? Although this question can be answered by actually testing soldiers, you will probably not have the time and resources to accomplish an empirical determination. Therefore, use your own judgment as to the appropriateness of the test.

8-3. Develop Tests for New Tasks. Much of the following material is adapted from Guidelines for Development of Skill Qualification Tests (US Army Training Support Center, December, 1977). Although these guidelines concern the development of SQTs, much of the manual is applicable to development of tests for training. You are encouraged to refer to this document for more details about test development as needed.

a. Choose Appropriate Test Mode.

(1) Types of Tasks. In order to choose the appropriate mode of testing for a particular objective, you must characterize the corresponding task on two dimensions:

(a) Physical Vs. Mental. Ask yoursel does the task performance primarily require physical activity (movement of the body and limbs) or does it mainly require thought? Because the focus is on testing at this point, the distinction between physical and mental tasks depends on what you would expect to observe if you were a tester. If you would expect to see mostly activity, then the task is a physical one. If, on the other hand, most of the action goes on in the student's head, then the task should be classified as mental.

(b) High Vs. Low Skill. Regardless of whether or not a task is physical or mental, ask yourself how much practice a soldier needs to execute the task. If he can be expected to perform the task after reading about or being told about the task with no more than a single practice trial, you may characterize the task as requiring low skill. If, in contrast, the task requires repeated practice in order for the soldier to execute it efficiently, the task requires a high level of skill.

(2) Types of Tests. There are essentially two types of tests which you can develop for an objective:

(a) Hands-on Tests: Soldiers are tested by performing the task on actual equipment.

(b) Written Tests: Soldiers must read questions and respond in writing.

(3) Choose Appropriate Test/Task Combination. Hands-on tests can be developed for all types of tasks. Written tests are probably appropriate for all tasks except high-skill, physical ones. When choosing the test mode, you have to make the following tradeoffs:

(a) Hands-on tests are relatively easy to develop in that they involve fairly straightforward translations of task/learning elements into performance measures. On the other hand, they may be expensive to administer in terms of accurately reproducing job conditions. And, in most situations, hands-on testing can only be administered individually.

(b) Written tests can be difficult to develop in that you must conceive of written test items that predict how well soldiers will perform the task. Therefore, development of appropriate test items may take time and require a good deal of creativity. On the other hand, written tests are relatively cheap to administer in that they do not normally require special equipment and can sometimes be administered on a group basis.

8-4. Develop Hands-on Tests. The central issue in developing hands-on tests is how performance is to be measured. There are basically two methods for measuring performance: One is to measure the product (outcome) of task execution; the other is to measure the process of task performance. To distinguish the two concepts, again imagine a soldier actually performing the task. If you would have to observe the entire performance in order to fairly evaluate it, you would be concerned with process measures. If, on the other hand, you need only to observe the result of task performance, you would need what are called product measures of performance.

a. Product Measurement. Of the two types of hands-on measures, product measures are more desired in that the outcome is easier to score and in that the tester does not need to vigilantly attend to task performance. Consequently scoring procedures are more easily standardized between testers. Note that "products" may not be tangible; they may be an action or results from an action. For instance, for a radio check task, a correctly operating radio is a valid product measure. To develop appropriate product measures, proceed as follows:

(1) Define Acceptable Product. The definition of an acceptable product ought to be implicit in the training objective. Elaborate on the standards if more detail is needed for scoring purposes. Sometimes the standard is stated in terms of a tolerated range of performance. This range should be stated in the definition of the product. Examples include "locate position within 50 meters" and "determine direction to plus or minus 2 mils."

(2) Specify Time Limits.

(a) Some tasks have inherent time constraints that are implicit in the performance standards. Examples include "acquire and engage target within 10 seconds." Be sure such constraints are specified. Any time limits that are less than one minute should be timed by a reliable stopwatch.

(b) Even if tasks do not have inherent time constraints, some limitation must be put on the test for purposes of test administration. This second sort of time limit should be sufficiently long to allow students to complete the test, and only cut off those who would likely have failed the test for other reasons. As a general guideline, the time limit for a single testing station should be no longer than 20 minutes at the maximum.

(3) Preserve Product. Some products are not long lasting, and must be preserved in order for the tester to measure it. An example product which may not last is a sight picture. Appropriate instructions to the tester should tell him how to preserve a product if need be.

b. Process Measurement. Process measures are relatively easy to obtain because they can be derived directly from a good analysis of the task. To develop appropriate process measures, proceed as follows:

(1) Ensure that Each Element Is Observable. Every element in the test must be observable. A particular problem in that regard is a checking behavior. A behavior such as "checking to see if the safety is in the SAFE position" may not be an observable element. You could drop the element from the test if it is nonessential to the behavioral process. However, if the check is essential or a required safety measure, the testing situation must be somehow contrived so that the behavior or the result of the behavior is observable. For instance, the equipment should be placed such that the check requires a turn of the head or movement of the limbs. In the example presented above, you could instruct the tester to place the weapon in FIRE before the test in order to assure that the student must make an overt movement as a result of checking the weapon.

(2) Examine the Number of Elements. The task steps ought to be detailed enough so that testers observe behavioral process in a standardized manner. On the other hand, too many elements (more than 20) on a scoresheet can overwhelm the tester. If the analysis lists many elements, some may be eliminated as unimportant; other elements may be observed and not scored.

(3) Determine Whether or Not Sequence Is Critical. In some tasks, behavioral elements must be performed in a set sequence. In others, only partial sequence or no sequence is required. Identify which, if any, part of the task must be performed in a particular order.

(4) Specify Time Limits and Tolerances. The considerations discussed above in para 8-4a apply to the development of process measures.

c. Combination Measures. Many tasks do not fall neatly into either product or process measurement category. Some aspects of the task are best scored by product measures; others, by process measures. The best strategy is to use both. This strategy is particularly appropriate where there are process elements of the task that are not evident in the final product. The following questions ought to be considered when deciding when to include process measures:

(1) Does the final product somehow obscure the process? In an assembly task, for instance, the exterior of an assembled weapon may obscure whether or not the components were correctly assembled in the interior. In that case, some process measures must be included.

(2) Are there safety measures to consider? An extremely important factor in test development is whether or not student errors may lead to injury or to equipment damage. Often, the only way to monitor appropriate safety related behavior is through process measures. Safety-related process measures must be included in any test. A related issue that must be resolved is whether to stop a student or to let him continue task execution once he has committed a safety violation. This surely depends on the nature of the violation; hence no hard-and-fast rules can be given for this determination.

(3) Does the student require feedback on the process aspects of the task? You must determine whether or not the student needs detailed feedback on his performance in order to determine the cause of his problem after failing a station. Detailed feedback usually requires attention to the process aspects of the task.

d. Test Conditions. Once the performance measures are determined, you need to determine the conditions under which the student will take the test. The rationale for this procedure is to specify important conditions that may affect performance and to control for their effect by standardizing conditions across students. The testing conditions ought to be derived from the statement of training conditions. However, testing conditions are, of course, more specifically concerned with the conditions during the test and are subject to the constraints of the testing situation. You need to examine three aspects of test conditions:

(1) Environment. Specify any important environmental condition which may affect behavior. "Important" is underscored to emphasize that not every condition (e.g., exact temperature, ambient light levels, etc.) needs to be specified. Example important environmental conditions are whether testing is to be held indoors or outdoors, and whether testing will be conducted on a group or individual basis.

(2) Equipment. Any equipment needed in the test, including manuals, should be stated as part of the testing conditions. Again, you should start by examining the equipment requirements as stated in the training objective.

(3) Station. Determine any special station set-up conditions that need to be specified. For instance, equipment controls may have to be placed on certain settings prior to testing students.

e. Instructions to the Tester. One of the important differences between hands-on and written tests is the relative importance of the tester. For written tests, the tester acts basically as proctor. He hands out the test, and perhaps reads some instruction. He has very little else to do while the test is being taken. For a hands-on test, in contrast, the tester has much to do before and during the test. In order to standardize hands-on tests, the testers must thoroughly understand their role. Consequently, the instructions to the tester are very important. At a minimum, the instructions to the tester should cover the following points:

(1) Describe how the station should be set up for the first student who goes through testing and any changes that must be made for the subsequent students.

(2) State in step-by-step fashion how the equipment should be set up before testing any students. Also, describe any maintenance or readjustments that must occur between students.

(3) State the maximum number of students that can feasibly be tested at one point in time. If product measures are being used, more than one student may be tested at a time. An important consideration in group testing is the extent to which students receive cues by observing the performance of other students. Your instructions should include provisions to prevent such cueing, e.g., minimum distances between students, methods for blocking visual cues, etc.

(4) Specify any time limits that apply. Include a description of when timing should start and when it should end.

(5) Include any special instructions such as the following:

(a) the extent of assistance allowed during task performance;

(b) any safety considerations that require the tester to interfere with test performance; and

(c) any special scoring instructions including instructions on how to use aids to scoring.

f. Instructions to the Student. Another difference between hands-on and written tests is that the instructions for hands-on tests must be read aloud. Consequently, you should write these instructions with the understanding that they are to be read. The emphasis should be on clarity in communication. Do not use acronyms or technical terms unless the student is very familiar with them. Remember that, in contrast to written instructions, the student will not have the benefit of rereading the instructions more closely if he does not understand. Test the comprehensibility of the instructions by reading them aloud to a colleague. Be sure the instructions cover the following points:

(1) The instructions may begin with a brief description of the job situation. The description may be a translation of the task conditions. For instance, if the task is normally performed under combat conditions, the instructions may tell the student to assume that he is under enemy fire. However, it should also be noted that job situations may not apply or may not be needed for some tasks.

(2) The instructions should describe to the student what is required of him so that he may begin the task. Be careful to avoid either overcueing or undercueing here. Overcueing is telling the student too much, i.e., telling him exactly what he is supposed to do. Undercueing is the opposite extreme: The student has too little information to perform the first step in the task and instructions provide no cues as to subsequent steps.

(3) State any time or accuracy standards that apply to task performance.

(4) State whether or not assistance will be allowed and the extent of the assistance.

8-5. Develop Written Tests. In order to develop an appropriate written test, you need to consider two distinctions used in test development:

a. Test Format. The first distinction relates to the format of the written test. The format can be described as either written performance or performance-based. It is likely that, in actual development of a written test, you may use a combination of written performance and performance-based items. Both formats are described below:

(1) Written Performance. This sort of written test format requires the student to perform the task as he would on the job. This format should be used whenever task performance can be measured as a written product. The format for a written performance test is similar to that of a hands-on test. Hence, many of the same guidelines apply. Examples of tasks for which written performance tests can be developed include identifying coordinates on a map, filling out standard forms, and determining range to a target using the mil formula.

(2) Performance-Based.

(a) A written performance test should be developed whenever product measures can be derived from written behavior. If not, you will have to develop a performance-based test. A performance-based test evaluates the knowledge that a student must possess in order to perform the task. In format, this type of test resembles a standard academic exam.

(b) In order to identify those knowledges and to develop appropriate test items, you need to identify reasons why a soldier typically fails to perform an element in a task. The following are some "generic" errors. Review each task element with respect to these errors so that you can develop appropriate test items:

1 Soldiers do not know where to locate certain objects or positions related to task performance. If this error is applicable, devise a test question wherein the student must identify the correct location.

2 Soldiers do not know when in a sequence of task elements to perform a particular step. A number of different questions should be developed to test the student's knowledge of sequence of the whole task or a particularly troublesome part of the task.

3 Soldiers do not know what the product or the end result of an element should look like. For instance, soldiers cannot engage targets successfully if they do not know what an appropriate sight picture is. Appropriate test items for this type of error may incorporate detailed descriptions or illustrations of the product.

4 Soldiers do not know how to perform a procedure. Test items should be developed depending upon the nature of the procedural error.

b. Response Format. The second distinction used in test development concerns the format of the responses that the student makes to answer the test items. There are two types: recognition and free response. Although both types of questions may be developed for either written performance or performance-based test formats, the recognition response is probably better suited for performance-based, whereas the free response technique is better for written performance tests.

(1) Recognition Responses.

(a) In the first response format, the student is required to recognize the correct response from a list of alternative responses. Examples of recognition response formats include multiple choice and matching. Frequently referred to as an "objective" technique, this response format has the advantage of being easy to score with essentially no problems in standardization. If appropriate recognition test items can be derived for a task, this is probably the response format of choice.

(b) By far, the most frequently used type of recognition test is the multiple choice format. The validity of a multiple choice test item depends largely on the selection of appropriate response alternatives. The alternatives must be plausible. That is, they ought to represent incorrect choices that soldiers make on the job. The number of alternatives ought to be dictated by the number of plausible responses. Obviously, there are some limits on the number of alternatives, however. There must be at least one alternative to the correct answer, and ten or more alternatives may be unwieldy to answer and to score.

(c) For a written performance test, the test standards should be derived from the job/training standards. However, the standard is less clear for performance-based test items because they are not as closely related to job performance. If the standards are not clear, use the following two standard rules that are used in SQT development:

1 Adopt an 80% criterion for passing a test. For instance, the criterion for passing a 4-item test is .8 X 4 = 3.2 or 3 test items, rounded to the nearest whole number.

2 Adopt a 100% criterion for passing a standard multiple choice item where only one alternative is correct. That is, the student must indicate the correct alternative and no others. For items where there is more than one correct alternative, the student must get 80% of the alternatives correct. That is, he must neither mark

incorrect alternatives (error of commission) nor fail to mark correct alternatives (error of omission) on more than 20% of all alternatives.[1]

(2) Free Responses.

(a) A free response is where a student is free to answer a written test item in his own words. This test format is analogous to an "essay" item on an academic test. This format is especially appropriate when the task involves a writing skill, such as filling out a form or making a report.

(b) The most serious problem with free response test items is in the scoring standards. The scoring key must clearly specify the minimum acceptable answer. Assuming that such standards can be clearly specified, the tester still faces the problem of deciphering answers that may be poorly written, both in terms of writing style and hand writing. And because of the relatively longer time required to grade free response compared to recognition response tests, the former response format may be impractical for courses having large enrollments.

8-6. Validate Tests. Compose draft versions of the tests and determine whether or not they are valid tests of the training objectives. Ideally, the validation process is conducted by actually testing both course graduates and non-course graduates. Procedural details for such a full-scale validation process are described in Guidebook for Developing Criterion-Referenced Test (Swezey & Pearlstein, 1975) and Guidelines for Development of Skill Qualifications Tests (TRADOC, 1977). As argued in Chapter 3, however, the resources required to test a large sample of soldiers and to analyze the data are beyond those of a typical course revision project. In lieu of such a full-scale validation, an acceptable validation procedure is to have experts review the tests. The following represents a systematic procedure for validating test using a small sample of experts.

a. Obtain Experts. At least five experts should be obtained to review the course in question and have significant experience in the job for which the students are being trained. In other words, experts should have the same MOS as course entrants but in a higher skill level.

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[1] The exception to this rule is where the student can pass an item by either marking all alternatives or failing to mark any of the alternatives. On a 10-alternative item, for example, the criterion for passing an item where there are multiple correct answers is 80% or 8 out of 10 alternatives correctly marked and not marked. However, if there are but two correct answers, the student could pass the item by not marking any of the alternatives. Conversely, if as many as 8 of the 10 alternatives are correct, the student can pass the item by marking all of the alternatives. In cases such as these, you must raise the criterion (to 9 out of 10 correct in both examples) to prevent such an anomaly in scoring.

Confirm beforehand that all experts can, in fact, perform the tasks by reviewing any available performance information (unit tests, SQT scores, etc.) or talking with their supervisors.

b. Written Tests. Have all experts take each of the written tests. Score the tests immediately and discuss errors with each expert individually. Specifically, ask experts whether or not each recorded error was either deserved or undeserved. If undeserved, solicit their ideas on making the test more accurate or fair. Experts may even volunteer errors the test procedure did not catch.

c. Hands-on Tests. Have two of the five experts act as testers. They should read the tester instructions to understand the test procedures. Then the two "testers" should use the Criterion Scoring Checklists to independently score the performance of the remaining experts as they take the test. Both testers and performers should review the results of the test, again paying particular attention to errors. In addition, you should examine the correspondence between the two scorers to see if they disagreed in scoring anyone. Be sure to determine whether the disagreements are due to a simple lapse in attention or to ambiguity in the scoring procedure that would indicate the need for a change.

d. Make Changes. Consolidate the suggestions derived from the experts' responses. The final versions of the tests should incorporate those suggestions that make the tests easier to administer from the tester's point of view and fairer to take from the student's point of view.

8-7. Example Test. To demonstrate how the test documentation is assembled, an example test is presented in Figure 8-1 at the end of the chapter. The test was developed for a 19K BNCOC task entitled "Prepare and Issue Oral Operation Orders." Much of the test is self-explanatory. However, the following points require some elaboration:

a. According to the proposed organization for 19K BNCOC, this task is located in the cluster entitled "Prepare Orders and Reports" along with two tasks. It is recommended that this task should be combined with the other two in the cluster for a test at the end of the block of instruction. In the current example, however, the test is presented separately to simplify the exposition.

b. The test is an example of a written performance test with a defineable product, namely the crew operation order. The test also employs a free response format in order for the student to compose the operation order. The free response affords a fairly close simulation of actual task performance. As discussed above, the free response format has some drawbacks. The problems are somewhat offset by the following considerations:

(1) The scoring of free format tests is less reliable than that for the recognition format. To compensate, the end product is defined as completely as possible, including a model report with which to compare student reports. Secondly, reliability is increased by having two testers score the student reports independently.

(2) Free format tests take longer to score than recognition tests. However, because 19K BNCOC is presently limited to 6-10 students per cycle, this criticism of free format tests is less critical.

c. One obvious difference between the training and testing objective is that the soldier is trained to both write and deliver the report orally to his crew, whereas the testing criterion requires him only to write the crew order. There are two reasons for the discrepancy:

(1) The written report provides a more permanent record of performance than an oral report. The test developer can surmount the problem of the relative impermanence of the oral report by tape recording student's responses. However, this procedure was deemed impractical given the time and resource constraints of 19K BNCOC.

(2) The oral part of the report is easier than the written part. In other words, if a tank commander can compose an appropriate crew order, he can surely deliver it. The oral part of the task may be practiced once or twice during training, but it need not be included in the end-of-course test.

TEST ADMINISTRATOR'S GUIDE

Prepare and Issue Oral Operation Orders

Task No. 071-326-5626

1. EVALUATION CRITERIA: Given a pencil, notebook, appropriate maps, and recorded platoon leader's orders, the tank commander must write out an appropriate oral operation order for his crew within 15 minutes after receiving the platoon leader's orders.

2. EVALUATION PROCEDURES: Students will be tested in a group in a classroom environment. Two testers will independently score the written operation orders of each student according to the Criterion Scoring Checklist. Testers should compare the scores of each student prior to providing feedback. Any disagreements between testers will be resolved by a brief conference. If the test results indicate that a student has not achieved the testing standard, then he will be given an explanation of his error and a chance to review the task requirements. He will then be tested a second time on the entire task using another recording of a different platoon leader's orders. If he fails a second time, he will be counseled by testers in an attempt to identify the source of the performance problem. Then he will be given a third test trial with a different platoon order. Any student failing the test three times will be referred to course administrators for appropriate action.

3. DIAGRAM OF THE TESTING FACILITY N/A.

4. LIST OF PERSONNEL, MATERIALS, AND EQUIPMENT REQUIRED FOR THE TEST:

   a. Two Criterion Scoring Checklists per student.

   b. One acetate-covered strip map of operations area and grease pencil per student.

   c. One synchronized slide projector/tape recorder to play three prerecorded platoon orders with map illustrations.

   d. One pencil and notebook per student.

5. TEST PLANNING TIME:

a.	Administrative time	10 minutes
b.	Test time	15 minutes
c.	Total time	25 minutes

Figure 8-1. Example Test Documentation

6. INSTRUCTIONS TO THE SOLDIERS:

a. Read the following instructions to the soldier, exactly as written.

AT THIS STATION YOU WILL BE TESTED ON YOUR ABILITY TO UNDERSTAND A PLATOON LEADER'S OPERATION ORDER AND TO WRITE AN APPROPRIATE OPERATION ORDER FOR YOUR CREW. IN THE PRERECORDED SCENARIO, IT IS 2100 HOURS. YOU RECEIVED A WARNING ORDER FROM YOUR PLATOON LEADER AN HOUR AGO, AND YOU ARE NOW PREPARING TO RECEIVE HIS PLATOON OPERATION ORDER. I AM NOW GOING TO PLAY A RECORDING OF HIS ORDERS. LISTEN CAREFULLY AND TAKE NOTES. I AM ONLY GOING TO PLAY THE RECORDING ONCE. AFTER HEARING THE PLATOON ORDER, YOU WILL HAVE 10 MINUTES TO WRITE OUT AN APPROPRIATE OPERATION ORDER FOR YOUR TANK CREW. BE SURE TO WRITE YOUR ORDERS LEGIBLY SO THAT WE MAY FAIRLY EVALUATE IT. REFER TO A POINT ON THE MAP BY MARKING IT ON THE STRIP WITH A NUMBER AND THEN USING THAT NUMBER IN THE REPORT. ANY QUESTIONS?

b. The platoon orders were recorded such that the "platoon leader" gives the orders in a clear and distinct fashion. Play the recorded platoon orders once for the students. Only under extra-ordinary circumstances (e.g., very loud noises that might mask the recording) should you replay the orders. Testers can answer any reasonable questions students might have after hearing the orders. Give the students 15 minutes from the end of the recorded platoon orders to complete writing their crew orders.

7. SAFETY PRECAUTIONS: N/A.

8. ADDITIONAL INFORMATION: Although the students listen to the platoon orders as a group, they should work on their crew orders independently. Both testers should closely monitor them during the 15 minute period while they compose their orders.

9. ANNEXES:

a. Criterion Scoring Checklist

b. Script for Platoon Order

c. Model of Appropriate Crew Order

Figure 8-1. Example Test Documentation (Continued)

CRITERION SCORING CHECKLIST

Prepare and Issue Oral Operation Orders

Task No. 071-326-5626

Name of Student _____ Date _____

Evaluator _____

	Evaluation						
	First		Second		Third		
	GO	NO GO	GO	NO GO	GO	NO GO	Comments
DID THE STUDENT'S CREW ORDERS INCLUDE EACH OF THE FOLLOWING PARAGRAPHS:							
1. SITUATION							
a. Enemy Forces	—	—	—	—	—	—	
b. Friendly Forces	—	—	—	—	—	—	
2. MISSION	—	—	—	—	—	—	
3. EXECUTION							
a. Scheme of Maneuver	—	—	—	—	—	—	
b. Fire Support	—	—	—	—	—	—	
c. Specific Instructions	—	—	—	—	—	—	
d. Coordinating Instructions	—	—	—	—	—	—	
4. SERVICE SUPPORT	—	—	—	—	—	—	
5. COMMAND AND SIGNAL							
a. Communications	—	—	—	—	—	—	
b. Succession of Command	—	—	—	—	—	—	

Figure 8-1. Example Test Documentation (Continued)

	Evaluation						
	First		Second		Third		
	GO	NO GO	GO	NO GO	GO	NO GO	Comments
DID STUDENT'S ORDERS INCLUDE AN ACCURATE REPORT OF THE ESSENTIAL POINTS IN EACH OF THE FOLLOWING PARAGRAPHS (SEE UNDERLINED PORTIONS OF APPENDIX C):							
1. SITUATION							
a. Enemy Forces	—	—	—	—	—	—	
b. Friendly Forces	—	—	—	—	—	—	
2. MISSION	—	—	—	—	—	—	
3. EXECUTION							
a. Scheme of Maneuver	—	—	—	—	—	—	
b. Fire Support	—	—	—	—	—	—	
c. Specific Instructions	—	—	—	—	—	—	
d. Coordinating Instructions	—	—	—	—	—	—	
4. SERVICE SUPPORT	—	—	—	—	—	—	
5. COMMAND AND SIGNAL							
a. Communications	—	—	—	—	—	—	
b. Succession of Command	—	—	—	—	—	—	

Figure 8-1. Example Test Documentation (Continued)

CRITERIA FOR PASSING TEST

To receive a GO, the student must receive a GO on all items and complete the task within 15 minutes. He may not be evaluated more than three times.

	First Attempt		Second Attempt		Third Attempt	
	GO	NO GO	GO	NO GO	GO	NO GO
OVERALL EVALUATION	—	—	—	—	—	—

DID YOUR EVALUATION OF THE STUDENT AGREE WITH YOUR PARTNER'S? YES NO

IF NO, HOW WAS THE DISAGREEMENT RESOLVED?

SIGNATURES

Evaluator _____ Soldier _____

Figure 8-1. Example Test Documentation (Continued)

ANNEX B

Platoon Operation Orders

1. SITUATION

a. ENEMY: Enemy forces are withdrawing east and appear to be occupying the far bank of the Green River. We can expect platoon size recon units to try to delay our advance toward Green River. Remember last week the enemy hit us with persistent chemical agents when we moved through Dexter. The terrain we'll be moving over consists of rolling hills, scattered trees, and in some areas, fields of fire to 3000 meters. The only obstacle is the Salt River, which is believed to be fordable in some places. Weather is expected to be clear and dry with winds at 10 knots from the west.

b. FRIENDLY FORCES: Our team will cross the SP at this location (indicate as Point 1 on the slides of the map) at 0600 hours tomorrow morning, passes through the 1/3 Cavalry at this point (Point 2), and moves east along Highway N4 to seize Hill 609, located here (Point 3). Our platoon will lead, followed by the team command group, the 3d Infantry Platoon, and the 2d Tank Platoon. Another team, with a similar mission will be moving east along Highway N2, 5,000 meters to our left flank. Our right flank will be open.

2. MISSION: Our platoon crosses the SP, moves through the cavalry crossing point, and leads the team in a movement to contact to seize Hill 609.

3. EXECUTION:

a. SCHEME OF MANEUVER: We will move past the SP and through the crossing point in a column formation; once clear of the cavalry position we will change to a combat column formation. Any other changes in formation will depend upon the tactical situation and the terrain. Whenever possible we will bypass enemy positions because speed in reaching Hill 609 is essential.

b. FIRE SUPPORT: Our platoon will initially have priority of fires within the team.

c. SPECIFIC INSTRUCTIONS: When approaching and passing through the cavalry crossing point, main guns will be at maximum elevation. As soon as we get into the combat column formation beyond the cavalry position, main guns will be at normal elevation. All formations and reaction drills will be in accordance with the unit tactical SOP. Be watching for signals from the platoon leader or the platoon sergeant, and remember to maintain your position in each formation.

Figure 8-1. Example Test Documentation (Continued)

d. COORDINATING INSTRUCTIONS: Movement will be in MOPP 1. Standto 0400, breakfast 0415, check assembly area 0515, crews mounted 0540, and depart assembly area 0550, cross SP 0600.

4. SERVICE AND SUPPORT: Our unit tactical SOP.

5. COMMAND AND SIGNAL:

a. SIGNAL: CEOI Index 1, Edition B is in effect. Listening silence is in effect until enemy contact. Two green star clusters is the emergency signal for shifting or lifting supporting or suppressive fires.

b. COMMAND: I will be in my usual platoon formation position. Succession of command is platoon sergeant, TC tank 2, TC tank 4. Time now is 2130 hours. Are there any questions?

Figure 8-1. Example Test Documentation (Continued)

ANNEX C

Model Crew Operation Orders

1. SITUATION:

a. ENEMY: Enemy forces are withdrawing to the east and are covering the withdrawal with recon platoon size delaying forces along Highway N4. The enemy has recently used persistent chemical agents against us. The terrain in the area consists of rolling hills, scattered trees, and some fields of fire to 3000 meters. The only obstacle short of Hill 609 is the Salt River, which appears to be fordable in some places. The weather will be clear and dry with westerly winds at 10 knots.

b. FRIENDLY FORCES: 1st Platoon will lead the team across the SP located here (indicated as Point 1 on the strip map) at 0600 hours tomorrow, passes through the 1/3 crossing point located here (Point 2), and moves east along Highway N4 to seize Hill 609 located here (Point 3). The 1st Platoon will be followed by the team command group, the 3d Infantry Platoon, and the 2d Tank Platoon. Another team will move east along Highway N2 5,000 meters to our left flank. Our right flank will be open.

2. MISSION: Our mission during the operation is to maintain the wingman position during movement and reaction formations, to respond to all platoon leader or platoon sergeant orders, to destroy enemy targets as acquired, and to submit appropriate reports.

3. EXECUTION:

a SCHEME OF MANEUVER: We will maintain our position in column formation until the platoon clears the cavalry crossing point. At that time, the platoon will move into a combat column formation, and we will maintain our wingman position in that formation.

b. FIRE SUPPORT: Our platoon has priority of indirect fires.

c. SPECIFIC INSTRUCTIONS: When we approach and pass through the cavalry crossing point, the main gun will be at maximum elevation. Beyond the crossing point, the main gun will be depressed to normal elevation. All formation and reaction drills will be per the unit tactical SOP. The loader and driver will be alert for platoon leader and platoon sergeant hand and arm signals.

d. COORDINATING INSTRUCTIONS: Movement will start in MOPP 1. Standto 0400, breakfast 0415, assembly area checked 0515, crew mounted 0540, depart assembly area 0550, and cross SP at 0600.

Figure 8-1. Example Test Documentation (Continued)

4. SERVICE SUPPORT: Per unit tactical SOP.

5. COMMAND AND SIGNAL:

a. SIGNAL: CEOI Index 1, Edition B is in effect with listening silence in effect until enemy contact. Two green star clusters is the emergency signal for shifting or lifting supporting or suppressive fires.

b. COMMAND: Succession of command is gunner, driver, loader, Time now is 2200 hours. Are there any questions?

Figure 8-1. Example Test Documentation (Continued)

CHAPTER 9

OUTLINE TRAINING PROGRAM

9-1. Introduction. Up to this point in the process of course revision, you have probably done most of the work yourself or with one or two assistants. You are now about to enter the development phase which will probably require the help of many more people. Prior to starting into the labor-intensive development phase, you should summarize the design of the revised training program and obtain the approval of training management.

9-2. Prepare Outline. The outline should present the work performed up to this point in an organized fashion. In a sense, the course outline resembles a POI. However, the POI is usually developed after all training materials have been produced and is therefore more detailed. In contrast, the following outline is designed to present the course only at the present stage of revision.

a. Overview. The first part of the suggested outline presents a general description of the course. It, in turn, consists of the following two subcomponents:

(1) Course Objective. The outline should start with a statement of the overall course objective as developed early in the revision process (Chapter 2).

(2) Prerequisites. From information given in the description of course entrants (Chapter 3), derive a reasonable list of requirements for students entering the course. In addition to any special entrance requirement (performance certification, precourse test scores, etc.), the following elements should also be included in the statement:

(a) minimum and maximum grade,

(b) military courses or schools from which the entrant must have graduated,

(c) minimum length of service or minimum remaining service obligation,

(d) whether or not a security clearance is required.

b. Course Summary. The course summary consists of every element of the course and the corresponding time requirements. The time requirements are all estimates, but they should give training management some rough idea of course length. Construct the summary according to the following procedures:

(1) Identify All Course Elements. There are at least three types of course elements you need to identify:

(a) the individual blocks of instruction within functional areas,

(b) any field exercises needed to support and reinforce classroom instruction, and

(c) noninstructional elements that require significant amounts of course time. Example noninstructional elements include:

1 testing activities,

2 in- and out-processing,

3 commandant's time, and

4 physical training.

(2) Identify Less Critical Elements. You may wish to present management with outlines for alternative courses which differ in length. Use the information obtained in the task prioritization process (Chapter 4) to develop a rationale for excluding certain tasks. For instance, one alternative might be a full course which includes all "must train" and "should train" tasks. (Of course, "don't train" tasks should not appear on any course outline.) As an alternative, you might also outline a shorter version of the course which only includes "must train" tasks. Other alternatives might include the most critical "should train" tasks as well.

(3) Organize Elements. Organize the instructional elements according to the structure/sequence determined earlier (Chapter 7). To this add the noninstructional elements identified above and any field exercises that are necessary supplements to classroom training. These latter elements should be inserted at the appropriate point in the structure/sequence of the course.

(4) Calculate Time Requirements. Calculate the total number of hours for the "complete" course and any other shortened courses to which you wish to compare and contrast. Proceed as follows:

(a) Estimate the number of hours required for each block of instruction. Wherever possible, base these estimates on times presented in the existing POI. Ensure that instructional blocks are consistent with an eight-hour training day (e.g., two related blocks of instruction could be trained in two, four-hour periods on the same day).

(b) Calculate the total time requirement at least three ways:

1 total number of hours,

2 total number of days assuming eight hours/day, and

3 total number of weeks assuming five days/week.

(5) Example Course Summary. Figure 9-1 presents an example of a course summary taken from 19K BNCOC. Several course elements have been added as shown by the footnotes. Detailed descriptions of these elements are presented in Morrison, Drucker, and O'Brien (1985). The presentation compares the hours required for the complete course, which should last about nine weeks, to a shorter course, which should take about six weeks to complete. The shorter course was derived by eliminating the "should train" tasks and eliminating the Country Fair Exercise.

Course Cluster/Activity	Hours of Instruction	
	6-Week Course	9-Week Course
In Processing[1]	8	8
Precourse Diagnostic Tests[1]	8	8
Leadership	8	20
Leadership Reaction Course[2]	4	4
Training Procedures	22	40
NBC	4	20
Mine Warfare	0	4
Communications	8	16
Land Navigation	18	32
Land Navigation Pathfinder Course[2]	8	8
Maintenance	12	16
Country Fair[2]	0	4
Tactics	20	52
Single Tank Tactical Exercise[2]	16	16
Intra-platoon Exercise[2]	32	32
End-of-Course Test[1]	8	8
Out Processing[1]	8	8
Totals	240	360

[1]Noninstructional elements added to course.

[2]Field exercises added to course.

Figure 9-1. Example Course Summary

c. Functional Area Annexes.

(1) The functional area annexes are the most detailed account of the course in that they list the training objectives for each block and tasks within blocks for each functional area. The objectives are all listed in the correct order within the functional area, and the annexes corresponding to functional areas are attached in the appropriate sequence.

(2) The following example (Figure 9-2) is a portion of the Tactics functional area annex that corresponds to the block of instruction on preparing orders and reports.

CLUSTER: Prepare Orders and Reports

OBJECTIVE: The tank commander must prepare and issue appropriate reports in a timely and accurate manner.

TOTAL HOURS: 8

TASK 1: Prepare and Issue an Oral Operation Order

OBJECTIVE: Given a pencil, notebook, appropriate maps, and a warning order to standby for an order; the tank commander must analyze a platoon leader's operation order, write out an appropriate and accurate crew operation order, and deliver it to his crew within 15 minutes of receiving the platoon leader's orders.

HOURS: 4 (2 lecture/demonstration, 2 practical exercise)

TASK 2: Prepare a Situation Report (SITREP)

OBJECTIVE: Given a tactical situation that, according to platoon tactical SOP, requires a situation report to be submitted; submit within 10 minutes an oral situation report by radio or hot loop to the platoon leader. The report must include all information in appropriate paragraphs of a standard situation report; locations and quantities must be encrypted; and brevity list of CEOI must be used.

HOURS: 2 (1 lecture/demonstration, 1 practical exercise)

TASK 3: Prepare and Submit a Standard Shelling, Mortaring and Bombing Report

OBJECTIVE: Given a report of either shelling, mortaring or bombing and a STANAG 2008 format, the tank commander must record the information received on a STANAG 2009 (DA Form 2185-R) and send the information to the next higher headquarters by the most rapid means (radio, telephone, or messenger) and encode as necessary.

HOURS: 2 (1 lecture/demonstration, 1 practical exercise)

Figure 9-2. Example Portion of Functional Area Annex

9-3. Present to Management. The outline of the course should be presented to management for formal approval. In a cover letter to the outline, present management with the following issues:

a. Introduction. Introduce the outline by describing its purpose. Be sure to emphasize its preliminary character.

b. Method. Present a brief summary of the method that you used to develop the course outline. If you are presenting alternative courses, be sure to include the method used to derive each version.

c. Development Costs. Estimate of time and personnel costs associated with development phases.

d. Equipment Costs. Provide estimated costs of any training equipment that is not in the inventory of the existing course.

e. Instructor Requirements. Provide your best guess at the number of instructors that are required to implement the revised course.

f. Length of Course. If alternative courses are compared/contrasted, be sure to describe how the alternatives were derived. Solicit management's opinion on the best tradeoff between the comprehensiveness of the course and the costs in terms of time and resources.

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APPENDIX
Comparison of Present Approach of Course Revision to Related ISD-Based Approaches

Course Revision Procedures (CRP)[1]	Systems Approach to Training (SAT)[2]	Interservice Procedures for Instructional Systems Development (IPISD)[3]	Armor School Procedures (ASP)[4]	COMMENTS
1. Examine Course Objective	1. Needs Analysis			- A needs analysis is not required for course revision; "need" is a given. - CRP & SAT are similar to the extent that the individual training plan proposal (TPP) of SAT states course objective.
2. Describe Course Entrants				- CRP provides for analysis of existing data only. - Placed early in revision process in order to affect task selection.
3. Revise Task Inventory	2. Identify Duty/Mission Requirements/Prepare Inventory	1. Analyze Job	1. Analyze Job	- CRP includes a limited job analysis during this phase. However, emphasis is on revising task list. - ISD provides for task analysis as part of job analysis.
			2. Perform Task Anaysis	- Re ISD & ASP, Vineberg & Joyner (1980) argue that task analysis is too expensive to perform prior to task selection.

Course Revision Procedures (CRP)[1]	Systems Approach to Training (SAT)[2]	Interservice Procedures for Instructional Systems Development (IPISD)[3]	Armor School Procedures (ASP)[4]	COMMENTS
4. Select Tasks for Training	3. Select/Determine Critical Tasks	2. Select Tasks/Functions	3. Select Tasks for Training	- CRP provides most explicit procedure.
5. Revise/Develop Training Objectives	4. Perform Task Analysis 5. Develop Task Performance Measures 6. Prepare Annotated Task Inventory 7. Select Instructional Settings 8. Develop Learning Objectives and Skill Hierarchies 9. Classify Objectives and Specify Learning Activities	4. Construct Job Performance Measures 5. Analyze Existing Courses 6. Select Instructional Setting 7. Develop Objectives	4. Select Training Site 5. Develop Objectives	- CRP provides for review of training objectives of old tasks. Objectives for new tasks are developed from a combined task/learning analysis. - Re SAT & ISD, Vineberg & Joyner (1980) argued that development and evaluation of Job Performance Measures is prohibitively expensive. - Re CRP "setting" is not an issue in course revision and therefore not included.
6. Sequence/Cluster Objectives	10. Identify Entry Behavior 11. Group and Sequence Instruction		6. Sequence and Cluster Objectives	- As argued in CRP and ASP, sequence/cluster should come before testing because tests are developed around clusters and not individual objectives. - SAT is incorrect in that entry behavior cannot be identified prior to test development.

Course Revision Procedures (CRP)[1]	Systems Approach to Training (SAT)[2]	Interservice Procedures for Instructional Systems Development (IPISD)[3]	Armor School Procedures (ASP)[4]	COMMENTS
7. Develop Tests	12. Develop Performance Test Items	8. Develop Tests 9. Describe Entry Behavior 10. Determine Sequence and Structure	7. Develop Test Plan 8. Develop Tests	- Re ISD, Vineberg & Joyner (1980) conclude that data collection effort for describing entry behavior is not justified. - Re ASP, the 2-step test development procedure follows SQT procedures.
8. Outline Training Program	13. Select Instructional Methods and Media 14. Design Lessons 15. Prepare Outline Training Management Plan	11. Specify Learning Events and Activities 12. Specify Instruction Management Plan and Delivery System	9. Develop Learning Activities	- Methods for specifying learning activities and media rely on learning taxonomy which Vineberg & Joyner (1980) characterize as "not well developed." - Re ISD, "design lessons" means to organize lessons into modules. - The outline phase of CRP and SAT are similar in concept; both differ from ISD.

[1]Described in the current document.

[2]TRADOC Reg. 350-7; major actions as described in Appendix A.

[3]TRADOC Pam. 350-30.

[4]Training Development Handbook (Draft Document, June 1980).