FOR FURTHER TRAN

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THE DEVELOPMENT OF INSTRUCTIONAL SYSTEMS

PROCEDURES MANUAL,

William R. /Tracey
Edward B. /Flynn, Jr.
C. L. John /Legere

Dec 70

240 p.

UNITED STATES ARMY SECURITY AGENCY TRAINING CENTER AND SCHOOL

FORT DEVENS, MASSACHUSETTS

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T H E D E V E L O P M E N T

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I N S T R U C T I O N A L S Y S T E M S

PROCEDURES MANUAL

by

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FORT DEVENS, MASSACHUSETTS 01433

IN REPLY REFER TO   IATEC   December 1970

SUBJECT: The Development of Instructional Systems Manual

TO: See Distribution

1. Increased requirements for training and diminishing resources demand the most efficient use of personnel, time, space, facilities, and equipment in support of the missions of the United States Army Security Agency Training Center and School. The primary mission of the School is to provide training which will produce personnel with the technical and professional skills needed to perform duties in field units. Overall management of this program requires a systems approach to learning. The Development of Instructional Systems describes this type of approach.

2. This manual has been written for USASA personnel who must design, develop, validate, and implement instructional systems. Its purpose is to provide them with a tested set of concepts, policies, and procedures which will enable them to complete the tasks associated with the planning and guidance of learning activities. The procedures outlined in this manual are directive in nature for USASATC&S staff and faculty and will be applied by all personnel involved in the development and implementation of instructional systems. The manual will also serve as a basic text for the training of instructional supervisors and may prove useful to field commanders in the planning and conduct of their on-the-job and apprenticeship training activities.

3. To facilitate revisions, the manual has been published in looseleaf format and provides separate chapter numbering. This instructional system can and will be improved as it is applied to additional courses and as educational technology develops. The present edition represents an updating of the original manual which was published 1 September 1966. Users of the manual are requested to submit recommendations for changes to this headquarters, ATTN: Educational Consultant.

FOR THE COMMANDER:

ALBERT BIDDLE
Major, AGC
Adjutant

F O R E W O R D

In February 1964, the staff and faculty of the United States
Army Security Agency Training Center and School, under the direction
of Brigadier General Phillip B. Davidson, Jr., then Commandant,
launched a full-scale, internal training audit. The purpose of this
audit was to make a systematic and searching study of all aspects of
officer and enlisted training, to identify strengths and weaknesses
of the training systems, and to develop a plan for an improvement
program. The study was called Project MINERVA. During the months
that followed, all members of the staff and faculty became deeply
involved in one phase or another of the project.

This manual is perhaps the most significant by-product of
Project MINERVA. It represents a cooperative effort by the authors
and many other people to develop and test a systematic approach to
the design, development, validation, and implementation of instruc-
tional systems. It truly reflects the experiences, talents, ideas,
and efforts of the personnel assigned to the command during its
conception and development.

It would be impossible to identify by name everyone who has
made a contribution to Project MINERVA and the production of this
manual. However, special acknowledgement must be made for the
unique contributions of several individuals.

To Colonel Kenneth R. Lindner, who succeeded General Davidson
as Commandant, must go the credit for providing the encouragement,
direction, and support so essential to the full implementation and
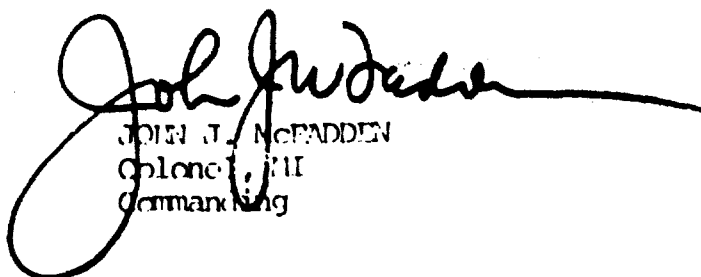success of the project.

Mr. Thomas A. Shealy, Technical Consultant, must be recognized
for his many valuable contributions as a member of the original
Project MINERVA Steering Committee and for his assistance in the
conduct of every phase of the project. To Colonel Arthur W. Hackwood,
then Assistant Commandant, must go the credit for providing the
vigorous leadership of the staff and faculty needed to maintain the
momentum of the project during its early stages.

Acknowledgement must also be made of the work done by Lieuten-
ant Colonels James B. Tyndall, Harold W. Wendlinger, George R. Mullin,
and Daniel W. Tierney; Majors Edwin M. Hutchins, Kenneth N. Greenlaw,
Jr., Jerry L. Sparks, Henry L. LaBrecque, Jr., and George S. Lapinskes;
Captain William B. Mason; Chief Warrant Officer Billy J. Wood and
Warrant Officer Larry E. Thorne; and Sergeant First Class Arthur J.
Brown. All of these personnel at one time or another were assigned
to the Evaluation Unit and participated in the testing of the materials.

JOHN J. McFADDEN
Colonel, FII
Commanding

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PREFACE

PURPOSE. During the last few years, many professional educators and training managers have underscored the need for a "systems approach" to instruction. Essentially, what they have recommended is the application to instruction of a strategy which has been eminently successful in integrating and managing complex components in weapons development. That is, the systems approach had its origins in the development of weapons systems, such as the Polaris nuclear-powered submarine missile system and the NIKE air defense missile system. Because training and instruction involve the interaction of several complex subsystems, educators have suggested that the principles and techniques used in the development of weapons systems be modified and applied in developing instructional systems.

The ultimate goal of any system, weapons or otherwise, is to achieve maximum internal operating efficiency of the elements of the system. A system must help a manager to plan, organize, staff, direct, and control the resources available to him to achieve a set of objectives; the system must aid the manager in reaching his goals by providing methods of operation which are maximally efficient and effective. In training and education, the overall goals are not difficult to define; but the means of reaching them have proven to be extremely elusive.

The goal of the US Army Security Agency Training Center and School is to design, develop, and validate instructional systems which will enable the School to train more students better and faster and with fewer resources. Specifically, the objectives are as follows:

*To train personnel more precisely for the military and technical duties they must perform in field units.

*To reduce the number of instructors and support personnel required to conduct the training.

*To shorten training time.

*To lower overall operating costs.

The purpose of this manual is to describe the procedures used to attain these objectives. That is, this manual is designed to provide the staff and faculty with a set of organized procedures which will make possible the planning, development, and validation of the instructional systems to be used in training US Army Security Agency personnel to perform efficiently in specific specialist, technical, or professional positions.

OVERVIEW OF STEPS. There are 15 major steps in the design, development, and validation of an instructional system. These steps are shown in figure 1 and indicate the chapters where discussed in this manual. The purpose of each step is described in the following paragraphs:

1. Collect Job Data. Too often, instructional programs have been constructed haphazardly. Many courses of instruction appear to have been developed with little more than a passing thought as to what should be taught. Resources are wasted simply because valid instructional objectives have not been identified. Training objectives must be based on valid job data: what the man is actually required to do in operating units, not on what someone recalls that he did or what he thinks a man should do. If instructional systems are not built upon a solid foundation of objectively-collected job data, the inevitable result is the inclusion of irrelevant content, the omission of required content, misplaced emphasis, and ultimately, an undertrained or overtrained product. The source of valid and realistic training objectives is, therefore, the man on the job in the field. The method of getting the data required to develop valid training objectives is job analysis. Chapter 1 describes the procedures to be used in performing job analyses.

2. Incorporate Operational Developments. A completed job analysis report describes the duties, tasks, and elements of a job performed by incumbents at the time the job analysis was made. For this reason, a job analysis presents a picture of a job as it exists, not as it should be, or may become. If an instructional system is based exclusively on data derived from periodic job analyses, it may include instruction which will be unnecessary by the time a graduate is assigned to the job in the field. Similarly, the training system will not include instruction in new duties and tasks, new equipment, procedures, or techniques added since the last job analysis was performed. Therefore, in addition to the data derived from job analysis, careful consideration must be given to the probable impact of evolving organizational systems, new concepts of operation, doctrinal changes, new equipment and materials, and techniques pertaining to the objectives of instructional systems. Chapter 2 describes the means of identifying operational developments and the procedures to use in incorporating them into the job data.

3. Select Training Objectives. The next step in the development of an instructional system is to select School training objectives from both the job analysis schedules and the related duties and tasks which have been established through the identification of new operational developments. The job data at this point detail the complete dimensions of an MOS, to include all of its variations caused by geographical and mission considerations. It would be extravagant, in terms of expenditure of time, personnel, and other resources, to provide the training to equip every graduate to perform every job task associated with a particular MOS in any unit anywhere in the world. It is often impractical to train personnel to the level of proficiency required on-the-job.
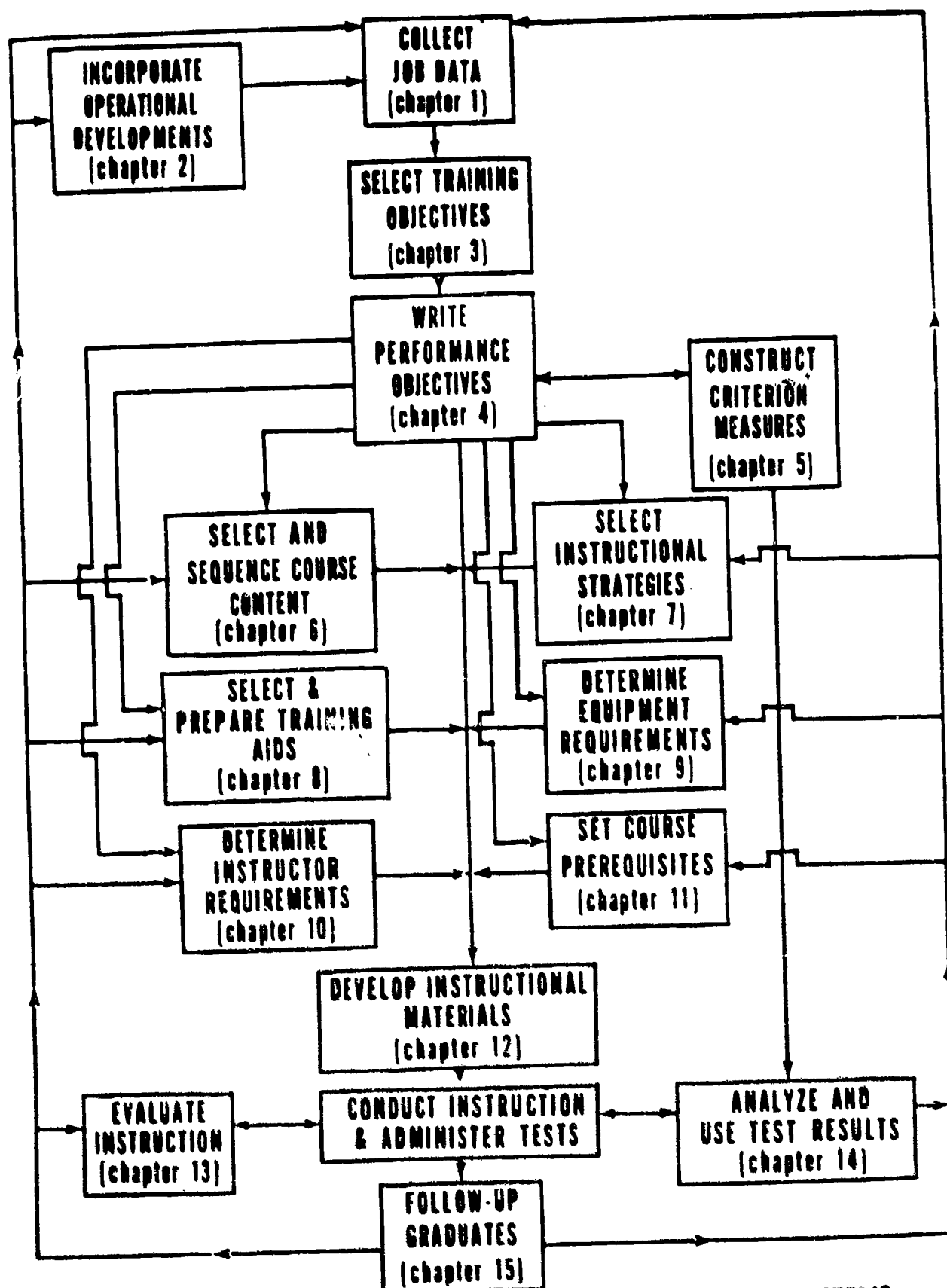
FIG. 1. THE DEVELOPMENT AND VALIDATION OF INSTRUCTIONAL SYSTEMS

Some training is more realistically and more practically conducted in the field unit. Consequently, it is essential to select from the total list of job performance those which are appropriate for formal School training and to decide what standards or levels of performance will be required for successful course completion. This is a judgmental procedure involving close scrutiny by qualified personnel of all job duties, tasks, and elements and the application of criteria which will insure that skills which are essential and appropriate objectives of School training are included in the objectives of a course of instruction. What remains in the job data following the selection of School training objectives constitutes the content of the on-the-job training program. Chapter 3 establishes criteria and describes the procedures to be used in selecting training objectives.

4. Write Performance Objectives. Part of the waste that occurs in training programs is directly due to the fact that objectives, even if valid, have not been stated in terms which permit the development of optimally efficient courses. For too long, the objectives of training programs have been stated in vague terms. We have talked about providing students with a "general knowledge" of this, a "working knowledge" of that, or an "understanding and appreciation" of something else. Statements like these are open to any number of interpretations, by instructors or anyone else. If we are to provide precise training, we must be able to describe clearly what it is that the man must be able to do, the conditions under which he must be able to perform, and the standard or criterion of acceptable performance. Chapter 4 describes the characteristics of a clearly-stated performance objective and defines the procedures to be used in writing these objectives.

5. Construct Criterion Measures. Final student qualification in an MOS-producing course is usually determined by one of two methods: relative standing (standing in class, standard scores, or percentile scores) or by a percentage cut (passing) score. These systems are ineffective because, for one, they determine qualification by comparing the performance of a man with his peers and, secondly, they set a score which may have little bearing on job performance. Conversely, with job data derived from job analysis such practices are no longer necessary. Because the performance objectives have been based on a detailed analysis of the job for which the student is to be trained, the "nice-to-know" has been diligently cut away. The criterion measure can consist of a test (or tests) which measures thoroughly every objective within the boundaries and terms stated in the objectives themselves. To show that he has attained the objectives, the student must meet or exceed the level of performance required for each of the essential training objectives. Because all objectives are essential, unsatisfactory performance on one part of the test cannot be compensated by superior performance on other parts. Under such conditions, relative grades or standings are meaningless. Standards for criterion measures, therefore, must be set in terms of absolute grades, scores, or levels of performance which

are acceptable on a "minimum passing" or "minimum qualifying" basis. Chapter 5 describes the procedures to be followed in constructing and validating internal criterion tests and MOS qualification tests.

6. <u>Select and Sequence Course Content</u>. After the required job performances have been described, the knowledges, skills, and values which support each performance objective must be identified and the sequence in which they are to be developed must be determined. Essentially, this requirement involves two closely related processes. First, each performance objective must be examined to identify the specific concepts, principles, facts, and elements of skill involved in each task; the procedure to be taken here is very much like that involved in determining the points to be taught in a conventional lesson plan. The problem is to avoid the inclusion of irrelevant content. The second process involves the arrangement of the content in the best sequence for learning. The problem here is to make certain that the development of concepts and skills is orderly and that prerequisite learnings have been acquired before advanced material is presented. Chapter 6 provides criteria, guides, and procedures for performing the tasks of content selection and sequencing.

7. <u>Select Instructional Strategies</u>. An instructional strategy is a method of teaching, a mediating device, a system of organizing instructors and students, or a combination thereof, designed to accomplish a specific instructional job effectively and efficiently. The term "method" includes the conventional lecture, demonstration, conference, and performance, as well as programmed instruction, tutoring, and combinations of these methods. Mediating devices include closed-circuit television, training aids, teaching machines, classroom student response systems, and the like. Systems of organization include conventional random groupings of students, homogeneous grouping, and such new systems of organization as team teaching and team learning. Each instructional strategy has certain advantages and limitations. These must be considered in selecting the most efficient instructional strategy. In addition, there are factors relating to the nature of the training objectives themselves, the course conten_, the student population, instructors, time, facilities, equipment, and materials which must be carefully weighed before deciding on a strategy. New instructional strategies must be exploited if the "lockstep" in training is to be broken. (By "lock-step" instruction is meant the practice of having a group of students go through a course of instruction at the same rate.) "Lockstep" instruction has the effect of boring fast learners and frustrating slow learners: the level of instruction is <u>too low</u> and the pace <u>too slow</u> for the <u>fast</u> learners, and <u>too high</u> and <u>too fast</u> for <u>slow</u> learners. The "ideal" is an individually paced instruction situation -- a solution that is well within reach with new developments in training. Chapter 7 identifies the more important instructional strategies, provides a detailed list of criteria to aid in the selection of appropriate strategies, and defines the procedure to be followed in arriving at strategy decisions.

8. **Select and Prepare Training Aids**. Although concrete, direct experience is the best means of learning, it is often necessary to use training aids as a substitute for or to supplement direct experience. Sometimes a training aid must be used because of the cost involved in exposing the student to the "real thing" or because of the danger to personnel or equipment which would result from such action. In other cases, training aids are necessary to bridge the gap between verbalization and direct experience. Training aids, then, are essential to the provision of efficient and effective instruction. Printed or duplicated aids, graphics, three-dimensional aids, projected materials and auditory aids all have their place. However, judgment must be exercised in selecting aids and using them. Chapter 8 sets forth basic selection guides and describes procedures for selecting and preparing training aids of all types.

9. **Determine Equipment Requirements**. Military jobs frequently involve the operation and/or maintenance and repair of equipment. For instruction to be maximally effective, the right kind of equipment must be in the right place and in the quantities required. Careful and complete planning and coordination are necessary to determine equipment requirements and to obtain the needed items well in advance of the time they are to be used. Chapter 9 identifies the basic data needed to determine equipment requirements and their sources; describes the factors to consider in selecting training equipment; establishes standards for determining equipment needs; and prescribes procedures for procuring equipment for training.

10. **Determine Instructor Requirements**. Although the role of the instructor may change as instructional technology develops, there will always be a need for personnel to set up the learning environment; to determine the types of learning activities most appropriate for the acquisition of specific skills and knowledge; to motivate, direct, and guide students as they engage in these activities; and to provide counseling service. Obviously, the number of instructors will vary with the size of the class, the system of organization, and the instructional strategy. The type of instructor skills required will also vary with the content to be taught and the instructional strategy to be used. Chapter 10 identifies the instructor capabilities required for successful application of the basic instructional methods, establishes standards for determining the number of instructors required, and prescribes procedures for determining both the numbers and types of instructors required to conduct the instruction.

11. **Set Course Prerequisites**. Prerequisites are the minimum qualifications required for enrollment in a course of instruction. Essentially, prerequisites represent a prediction of the aptitudes, skills, knowledge, and experience required for successful course completion. Prerequisites are used to select or develop aptitude tests for use in

screening personnel for assignment to courses; to serve as a basis for collecting data about course applicants or nominees; and to assist instructors in lesson planning and developing instructional materials, including achievement tests. Precise selection and definition of prerequisites are essential to avoid the waste of training resources and to insure that graduates of a training system will be able to perform at an acceptable level when assigned to field units. Chapter 11 identifies the prerequisite elements which must be set up for an instructional system and prescribes procedures for establishing, evaluating, and validating prerequisites.

12. **Develop Instructional Materials**. At this point, a complete instructional system has been developed to produce graduates equipped to perform specific jobs in the field: the input to the system has been identified in terms of prerequisites; the output has been described in terms of performance objectives; and the means of producing the desired product has been specified in terms of the instructional strategy and the supporting training aids to be used. Course content has been selected and sequenced. Equipment and instructor requirements, both numbers and kinds, have been determined, and criterion measures have been developed. All that remains to be done is to collate these data into a program of instruction with its supporting lesson plans and to set time allocations for each instructional unit. Chapter 12 describes the procedures to be used in establishing time allocations and for preparing, reviewing, and distributing lesson plans and programs of instruction.

13. **Evaluate Instruction**. All efforts up to this point have been focused on the development of an instructional system. Now the system must be subjected to evaluation to insure that the content, sequence, strategy, supporting personnel, facilities, equipment, and materials of instruction are consistent with the performance objectives, appropriate for the students, and actually do the intended job. This step involves observation of the system in action by evaluating "on-going" instruction in the classroom, shop, laboratory, or field. Data derived from observation and evaluation are used to judge the adequacy of system components and to make modifications where required. Chapter 13 identifies the components of the system to be evaluated, the perspectives to be represented in the evaluation, pitfalls to avoid, and the procedures to be followed by evaluators.

14. **Analyze and Use Test Results**. Criterion test results provide another means for evaluating the adequacy of the instructional system. Well-constructed tests provide an excellent means of quality control. If student performance on the test indicates mastery of the behaviors which were the objectives of the system, the system is an effective one. In many cases, the results of the administration of all criterion measures must be subjected to a complete and detailed statistical analysis, with the resulting statistics being reviewed to determine whether the objectives of the instruction have been achieved, and specifically where, if

applicable, the system requires revision. Chapter 14 describes the uses to which test results should be put, identifies the types of statistics which should be derived, and prescribes procedures for the analysis and use of test results.

15. _Follow-up Graduates_. The real proof of the effectiveness of an instructional system is the quality of the graduates' job performance in the field. Therefore, the final quality control point in the system is based on the collection and analysis of objective data regarding the on-the-job performance of graduates. Using procedures similar to those used in performing job analysis, teams must be sent to field units to evaluate the performance of men trained under the system. The focal point of the followup is the quality of the performance of the graduate as evaluated by team members, the job incumbents, their immediate supervisors, other supervisory personnel, and the unit commander. Data derived from these followup visits are used to study the adequacy of the system and as a basis for system modifications. Chapter 15 describes the objectives of the followup process, uses of followup data, and procedures for the conduct of followup.

CHAPTER 1

COLLECTING JOB DATA

A. INTRODUCTION

1. **Definition.** Job analysis involves the collection, processing, and interpretation of data concerning the work performed by personnel occupying those military positions requiring the performance, or direct technical supervision of performance, of a military occupational specialty (MOS). The process of job analysis consists of a sequence of tested procedures designed to accomplish the following:

 a. Collect, record, analyze, and interpret the duties and tasks performed by military personnel in specific MOS.

 b. Describe the environmental factors surrounding the performance of these duties and tasks.

 c. Identify the skills, knowledges, and abilities required to perform the duties and tasks.

 d. Determine acceptable standards for the performance of duties and tasks.

2. **Objectives.** The objectives of job analysis are as follows:

 a. To provide the HQ, US Army Security Agency staff with the amount and kind of information needed to carry out functions which involve jobs and job incumbents; e.g., recruiting, selection, classification, training, assignment, etc.

 b. To provide the US Army Security Agency Training Center and School staff and faculty with detailed information about each job: what it consists of, how and why it is performed, how it relates to other jobs, the conditions under which it is performed, the standards of acceptable performance, the frequency and criticality of specific tasks, and the equipment and materials used. These data are used in determining the objectives, content, sequence, emphasis, and means of conducting and evaluating training programs.

3. **Importance.** Job analysis is the first and the most critical step in the development of an instructional system. The data collected by job analysis teams provide the foundation for the system. Regardless of how well the subsequent steps are carried out, if job analysis data are not valid and reliable, the resulting system will fail to produce personnel who are able to perform their duties at an acceptable level.

4. **The Need for Command Coordination, Supervision, and Control.** Although job data are collected at the lowest level of organization (the operator, repairman, or supervisor), the procedures used must be coordinated and controlled at a high level of command. If this is not done, the training program will reflect "what exists" and not "what should be."

If a school performs job analysis and uses the data to construct a training program without an adequate screening or review, there is a serious risk of reflecting "field expedients" or "stop-gap" measures in the training system. Job data must, therefore, be collected under the supervision and control of the headquarters staff, and the resulting conclusions must be reviewed by the staff. When this is done, the data with which personnel work in developing instructional systems will be officially sanctioned. Of equal importance is the fact that this procedure enables coordination of such related actions as recruitment, selection and assignment, equipment research, development, and procurement.

5. <u>Authority</u>. The Command Job Analysis System is currently operated under the staff supervision of the Deputy Chief of Staff for Personnel, HQ, USASA. This system calls for representatives of the HQ USASA Deputy Chiefs of Staff for Personnel, Force Department, Logistics, Research and Development and representatives of the USASATC&S to serve as members of job analysis teams. Following consolidation and analysis of job data, a report is staffed through HQ, USASA and, where necessary, comments reflecting the headquarters' requirements are added. These comments are used to justify modifications of field-generated job analysis data.

B. PHASES IN JOB ANALYSIS

1. <u>Planning and Training</u>. Prior to the actual collection of job data at field units, a great deal of preliminary planning and training must be done. During this planning and training phase, the functional area to be analyzed is selected, members of the job analysis teams are chosen, administrative arrangements are made, fiscal approvals are obtained, job analysts are trained, and data collection forms are developed.

2. <u>Collecting Job Data</u>. During this phase, job analysis teams visit selected field units. By means of interview and observation of job incumbents, and interviews with supervisory personnel, the teams collect the data which describe the job, the conditions under which it is performed, and the standards of acceptable performance.

3. <u>Consolidating Job Data</u>. Upon completion of visits to field units and return to HQ, USASA, job analysis teams begin the third phase, the consolidation of data. During this phase, the individual job analysis schedules completed in the field are consolidated into one report which describes the division of jobs, duties, and tasks within the functional area studied.

4. **Analyzing and Reporting**. In this last phase, the consolidated job analysis report, together with the feeder reports, is analyzed to determine requirements for new jobs, revised job descriptions, new training systems, changes to existing training programs, equipment requirements, etc. These requirements are used as a basis for developing recommendations, which, when appended to the job analysis report and approved, become directives.

C. THE STRUCTURE OF JOB DATA

1. **Basic Structure of Jobs**. There is a basic structure which is common to all jobs. This fact makes it possible to develop and apply a standardized method of studying jobs. The term "job" is applied to a particular unit in the hierarchy of work done to produce goods and services. The nature of the work hierarchy is described as follows: "The work hierarchy has as its base the work operations a single worker performs in doing a portion of his job; the discrete motions, mental processes and movements. Its upper limit is formed by the work operations accomplished by groups of individuals combined into organizations. Various names are given to the units that compose this range of work operations for the production of goods and services. Significant for an understanding of basic job structure and job analysis are the following terms: position, job, duty, task, and element.[1] Figure 1 shows the interrelationships between job, duties, tasks, and elements.
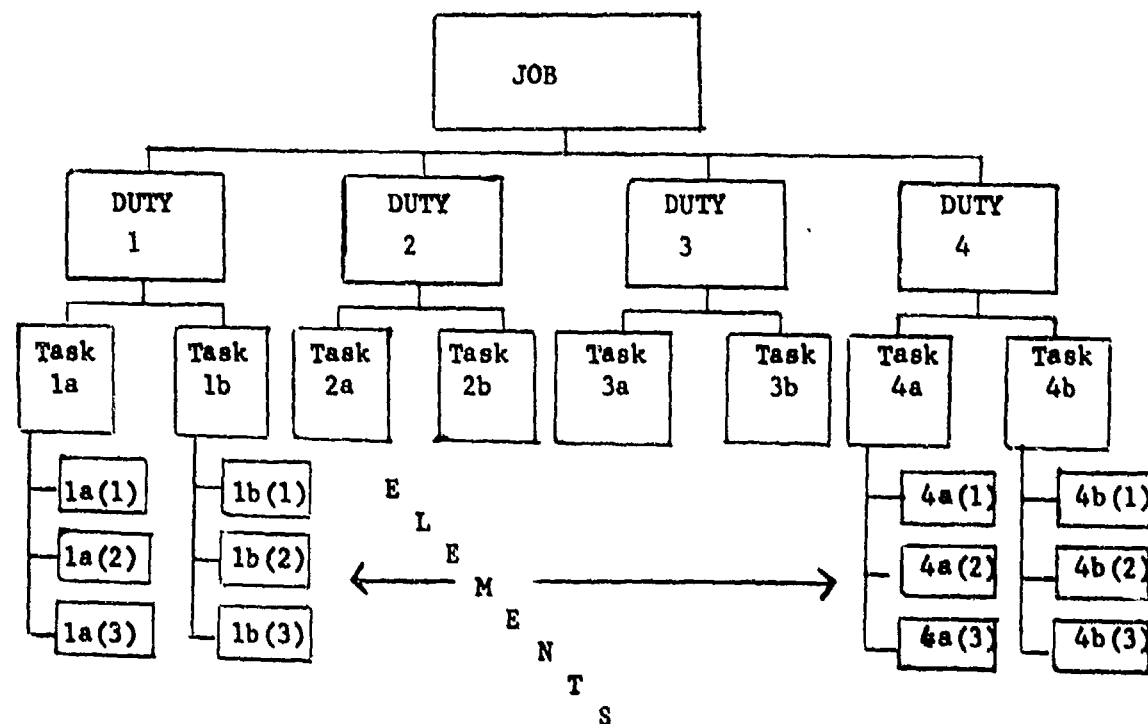
Figure 1. Interrelationships of job, duties, tasks, and elements.

[1] _Army Job Analysis Manual I, SOB Report 1-60-OR_ (Department of the Army, March 1966), p. 4.

2. **Definitions of Job Analysis Terms.**

a. **Position.** A position is a grouping of duties and respon-
sibilities which comprise the principal assignment of one person. It is
the basic functional unit of an organization. A position has the fol-
lowing characteristics:

(1) It has a definite purpose and scope.

(2) It requires the full-time service of one individual.

(3) It involves work which usually utilizes related
skills, knowledges, and abilities.

(4) It is usually officially established and formally
recognized in a manning table.

(5) It exists, whether occupied or vacant.[1]

b. **Job.** The duties and tasks performed by one man constitute
his job. The term job is applied to a group of identical positions;
that is, if identical duties and tasks are performed by several individ-
uals, they all hold the same job. "A job is the unit with which the per-
sonnel transactions of selection, training, classification, and assign-
ment are usually carried out. In the Army, such groupings or jobs are
defined as Military Occupational Specialties (MOS). These MOS, by iden-
tifying job requirements and individual qualifications, facilitating
distribution of personnel, by providing for broadly trained replacements,
and by reducing the training time through facilitating more accurate
estimates of force requirements, form the occupational basis of the
Army's personnel management system. In fact, it may be considered the
point where the personnel management system begins."[2]

c. **Duty.** A job is made up of one or more duties. A duty is
a large segment of the work done by one individual. It is a major sub-
division of the work performed by one man. The following are distinguish-
ing characteristics of a duty:

(1) It is recognized, usually, as being one of the posi-
tion (job) incumbent's principal responsibilities.

(2) It occupies a reasonable portion of the position (job)
incumbent's worktime.

(3) It occurs with reasonable frequency in the work cycle.

(4) It involves work operations which use closely related
skills, knowledges, and abilities.[3]
"It is performed for some purpose, by some method, according to some
standard with respect to speed, accuracy, quality, or quantity. This
standard may be provided by the position (job) incumbent himself through
trial and error or as a result of experience; it may be furnished to the
incumbent by his superior in the form of oral, written, or graphic
instructions; or, it may exist in the form of directives, published oper-
ating procedures, or similar media. Duties may be considered as major
or minor, depending upon the extent to which they establish demands for
skills, knowledges, aptitudes, physical capacities, and personal traits,
and upon the percentage of total worktime involved in their performance.
A duty, major or minor, has one or more of the following characteristics:

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[1] Ibid., p. 5.

[2] Ibid., p. 7.

[3] Ibid., p. 5.

(1) It is a significant determinant for initial assignment to the position;

(2) It is a significant determinant of pre-assignment or post-assignment training;

(3) It is significant in the determination of qualification required to perform in the position."[1]

d. **Task**. A task is a unit of work activity which forms a consistent and significant part of a duty. The tasks which constitute a job are not homogeneous units of behavior; they are logically differentiated segments of work activity. A task, then has the same relationship to a duty as a duty has to a job. "Each duty is made up of one or more tasks. A task is one of the work operations that constitutes a logical and necessary step in the performance of a duty. It is the work unit that deals with the methods and procedures and techniques by which duties are carried out."[2] Each task has the following characteristics:

(1) It occupies a reasonable portion of the worktime spent in performing a duty.

(2) It occurs with reasonable frequency in the work cycle of a duty.

(3) It involves <u>very</u> closely related skills, knowledges, and abilities.

(4) It is performed according to some standard.[3]

e. **Element**. The element is the most detailed level of work activity described in Army job analyses. Tasks are made up of elements. These are the smallest steps into which it is practicable to subdivide any work operation without analyzing separate motions, movements, and mental processes involved. An element is a meaningful and useful grouping of these basic work units. It is the work unit that deals with the details of how the methods, procedures, and techniques involved in a task are carried out.[4]

3. **Form to be Used in Collecting Job Data**. Data collected to describe the jobs, duties, tasks, and elements of positions for which School training must be conducted must describe all aspects of the job.

The most complete and meaningful description of a job is a statement which identifies the basic behavior required of the job incumbent, the conditions under which he will perform, and the standard or criterion of acceptable performance. Data reported in this form without further treatment are immediately usable in establishing objectives for a training system.

The following format is therefore advocated for reporting job, duty, task, and element descriptions:

"<u>Behavior</u>: The behavior should be a statement of what the man does, or must do. This will usually be something that you can see the man do. The statement of the behavior begins with a verb. It is an actio   Such words as COPIES, ADJUSTS, SOLDERS, SUBSTITUTES, ETC., will star. a statement of behavior.

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[1] <u>Ibid</u>., p. 5-6
[2] <u>Ibid</u>., p. 6
[3] <u>Loc.cit</u>.
[4] <u>Loc.cit</u>.

Condition: The condition outlines the factors which directly affect the man's performance. It is a statement of what the man is given to do the job, or what he is not given to do the job. The condition will list the tools, equipment, degree of supervision, and assistance which the man will or will not have to do the job.

Criterion: The criterion will list the index of acceptability which is used to judge the quality of the man's performance. This section should describe the criterion of acceptability in terms of QUALITY, i.e., accuracy, tolerance, completeness, format, sequence, clarity, neatness, and number of errors; QUANTITY, i.e., number of work units produced per time unit, and number of work units required by the nature of the job; and TIME, i.e., speed of performance. These criteria must be objectively justified by listing an Army Regulation (AR), Technical Manual (TM), etc., which references the criterion. If one does not exist, the source of information must be listed, e.g., consensus, individual knowledge, etc."[1]

D. PROCEDURES

1. Planning and Training.

a. Selecting Job Analysts. Job analyses will be performed only by carefully selected military and civilian personnel who have received training in the conduct of job analysis. Team members may be drawn from any staff element of HQ, USASA and any element of the USASATC&S.

(1) HQ, USASA representatives are selected by DCSPER from nominees submitted by other staff elements.

(2) USASATC&S representatives are selected by the Assistant Commandant from nominees submitted by academic and staff elements.

b. Selecting Specific Units for Survey. Chief, Evaluation Unit, in coordination with HQ, USASA and the USASATC&S staff elements, will select specific units for survey which:

(1) Have Table of Distribution-Augmentation (TDA) spaces authorized for the functional areas and MOS to be analyzed.

(2) Have a minimum of five job incumbents who match selection criteria identified in paragraph 2 c of this section.

(3) Are representative of all "type" user units and all echelons of command.

(4) Are representative in terms of the major missions.

(5) Reflect "typical" job requirements in the MOS to be studied.

(6) Are geographically and environmentally representative.

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[1]C. L. John Legere, USASA Command Job Analysis System, Job Analysis Handbook and Guide, 2d ed, (Fort Devens, Mass., 1966), p. 15.

c. __Making Administrative Arrangements__. Chief, Evaluation
Unit will coordinate administrative arrangements to include:

       (1) Funding.
       (2) Preparation of orders.
       (3) Obtaining passports and visas.
       (4) Innoculations.
       (5) Travel reservations.
       (6) Notification of units to be visited of purpose, time,
and duration.

d. __Training Job Analysis Teams__.

       (1) Chief, Evaluation Unit will present a formal course
of instruction in the conduct of job analyses as required. Annex A to
this chapter contains an outline program of instruction for training
job analysts.

       (2) As a part of their training program, job analysis
team members will:

          (a) Study documents relating to the mission, organ-
ization, and capabilities of units to be visited.

          (b) Review equipment authorizations for units to be
visited.

          (c) Study current Army regulations concerning job
descriptions of MOS to be analyzed.

          (d) Review existing job analyses, if available.

          (e) Prepare prestructured data collection forms.

          (f) Prepare and rehearse standard briefings for:

             <u>1</u>. The theater commander.
             <u>2</u>. Unit commanders.
             <u>3</u>. Supervisory personnel.
             <u>4</u>. Job incumbents.

          (g) Develop a schedule for the conduct of the anal-
yses. A typical schedule is attached as Annex B to this chapter.

2. __Collecting Job Data__.

a. __Preliminary Activities__. Upon arrival at each unit, the
job analysis team chief will:

       (1) Brief the unit commander and his staff on the pur-
poses, procedures, and requirements of the team.

       (2) Request a command mission briefing and tour of facil-
ities.

b. __Unit Analysis__. Before job data are collected, unit analy-
sis must be performed by job analysis team members to determine what
duties and tasks are performed in the unit. This analysis does not deal
with MOS codes or job titles; rather, it is concerned with analysis of
a functional area; i.e., maintenance, collection, or analysis. The ob-
jective of the analysis is to list, analyze, and group the mission tasks
of the unit to determine the configuration of jobs which exists. (A
sample unit analysis form is at annex C.)

c. <u>Selection and Briefing of Interviewees</u>: Team members will:

(1) Brief the staff on requirements and request that nominations be made for the interview and observation of incumbents who:

(a) Perform duties typical of the functional area identified.

(b) Perform duties with average satisfactory proficiency.

(c) Have been working in the MOS for a long enough period to be adjusted to it, but not for such a long period of time than their awareness of the differences between various steps has been lost.

(d) Do not possess unusually extensive or limited educational backgrounds, or unusually varied or limited prior work experience.

(2) Review records of nominees and select personnel for interview and observation.

d. <u>Preparation of Interviewees</u>. Team members will:

(1) Brief job incumbents on the purpose and procedures of job analysis.

(2) Set up a schedule of interviews and observations.

(3) Distribute equipment lists for completion by incumbents.

e. <u>Interviewing, Observing, and Recording Data</u>.

(1) <u>Interviewing</u>. In conducting interviews with job incumbents, team members will:

(a) Establish rapport before attempting to collect data.

(b) Let the job incumbent describe his duties (don't tell him what he does).

(c) Get at the specifics of job performance.

(d) Record data carefully.

(e) End the interview when the incumbent can no longer give pertinent and useful information.

(2) <u>Observing</u>. In observing the job incumbent perform the duties and tasks of his job, team members will:

(a) Observe long enough to witness performance of all major duties.

(b) Avoid getting in the way.

(c) Ask questions only when necessary.

(d) Make careful notes of observation including environmental conditions and contingencies.

(3) <u>Recording</u>. Team members will record data on the prestructured Job Analysis Report form as follows:

a. <u>Part I - Identifying Information</u>. (Sample is attached as annex D.) All information required to modify a particular job analysis report, to fully identify the unit in which the job incumbent works, and to present background information about the man himself will be recorded in this part of the report. One copy will be completed for each job incumbent interviewed. Information will be recorded as follows:

1. The Approvals section of the Job Analysis Report will be filled out after the report has been completed. The approvals are an important link in establishing the fact that these job data have been seen by the staff personnel of the station and that the official sanction of the command has been given. When utilizing these job data during the analysis phase, this fact will be critical.

2. When completing the Identifying Information section, "pin down" the actual MOS code and title of the duty position being analyzed. Some general titles will be used when the unit analysis is made. All identifying information must be official and reflect what is actually authorized at that station. The "working title" is very important because it may reflect the functional work area with which the man has been identified. The geographical location of the unit is also important. If the official unit designation does not reflect a detachment structure, and job data are being collected at a remote site, the actual location will serve to make the latter point clear.

3. The TDA information must be collected from the staff of the section being visited. Don't count on each individual's knowing just which TDA his unit is using. Get this information from the officials of the station. When analyzing the collected data, it will be necessary to check all TDA for additional information to correctly identify each individual in the light of the particular TDA of which the incumbent is a part.

4. The organizational information may be collected during the command briefing and tour. This information should be about the subdivision visited. The station-wide data will be collected by the team chief. This information will be difficult to collect during the briefing and tour, so all data must be validated later. Make it as accurate as possible by having unit personnel, when interviewed and observed, add to it, correct it, and amplify what has been collected. The organizational charts should include the name of the person filling the position as well as the name of the position; e.g., Maintenance Officer, Captain Jones; NCOIC, SGT Smith.

5. The information describing the supervision which the individual receives, the supervision which he exercises, should always be validated with the individual's supervisor. The degree to which people understand, or are willing to admit, the supervisory structure of which they are a part, may be surprising. When describing supervision be sure to use the levels as designated in the standard terms.

6. The job analyst should get a copy of pages 1, 2, and 3 of each incumbent's DA Form 20. If this cannot be accomplished, the following information should be extracted from the incumbent:

    a. Item 23 - MOS Evaluation Score.
    b. Item 24 - Aptitude Test Scores.
    c. Item 25 - Other Test Scores.
    d. Item 27 - Military Education.
    e. Item 28 - Specialized Training.

f. Item 30 - Languages.

g. Item 32 - Civilian Education.

h. Item 34 - Civil Occupation.

i. Item 38 - Assignments.

(b) Part II - Details of Duties and Tasks. (Sample is attached as annex E.) Specific directions for completing this form are as follows:

1. Activities of the visited command which are most critical and time consuming have been identified during the unit analysis; and nominees from the various levels, i.e., basic, intermediate, and advanced, and supervisory activity within these functional areas, have been proposed for interview and observation. Therefore, the men selected for interview will not be complete "unknowns." The first task with each interviewee will be to determine which major duties he performs, i.e., operates, maintains, processes, reports, or supervises. When it has been determined which of the duties he is involved with, the duty outline is used to determine which tasks within the duties he is actually working with. During this process, some tasks will be eliminated and some added. The duty outlines of the work activities for which he is responsible will now be an accurate list of the tasks performed within that duty.

2. Use these duty outlines to collate a job analysis report form for the individual from the pages in the kit of forms. For each duty which is the responsibility of the selected job incumbent, collate the following: (This procedure applies to part II of the job analysis report.)

a. Cover page which identifies the job incumbent and job analyst.

b. A Duty Outline Sheet for each duty. Each duty should be separated. The duty outline included with the individual's job analysis report should be the one previously used to inventory the tasks performed by that individual.

c. A Duty Behavior Statement Sheet for the same duty as indicated in the duty outline should be included. The form should be completed very carefully. The condition and the criterion sections must be as complete and objective as possible. Check the behavior section to insure that the prestructured portion is accurate and complete. (See annex H for importance code and supervision standards.)

d. A Duty Continuation Sheet should be included for each duty. The continuation sheet will identify other pieces of equipment on which this duty activity is performed by the same job incumbent. This sheet will also list any changes required in the statements of the condition and the criterion to make them applicable to the different items of equipment.

e. A Task Behavior Sheet will be prepared for each of the tasks which have been checked or added to the Duty Outline Sheet. These Task Behavior Sheets will be completed with the same attention to detail given the duty behavior statement. Check the prestructured behavior for accuracy.

1-10

_f_. An Element Sheet for each task should
be attached when required. This list must be a clear, concise picture
of the behaviors necessary to perform the elements of the task. It
must be included if the conditions or criteria need additional explana-
tion. Additional sheets for tasks and elements should also be added if
required.

(c) Part III - General Information. (Sample is
attached as annex F.) Part III has spaces for definitions, environ-
mental conditions, and general comments. This section should be used
to "pin down" any words which are used in a different manner at the
station, and to standardize the use of technical terms. When a man per-
sists in the use of a word which does not correspond to the list of
standard terms, this word must be equated to the standard term. This
is the tone of part III; all information which requires explanation or
modification must be included.

1. Definitions. Job analysis reports contain
many references to technical terminology and jargon which must be under-
stood in order to properly analyze the data upon return from the field.
The definition section will contain the explanation of terms which
appear in the Job Analysis Report, part II.

2. Environment. The environment within which
the job incumbent works is a very important variable which must be con-
sidered in the overall job analysis. Environment includes the physical
setting, physiological factors, nuisances, the mental set, and any
other factors which are variables in the performance of the job. The
supervision which the individual receives, or gives, must also be con-
sidered as part of the environment. Although this factor will be used
to complete certain parts of the job analysis data in other sections, it
is also an environmental item. If identification of "level" by numeri-
cal symbol does not fully explain the influence of supervision upon the
individual, it must be explained here.

3. General comments. The comments which the
man, his supervisor, or the staff of the command make about the partic-
ular position which the job incumbent fills should be listed in the
general comments section. This information is valuable, but is usually
subjective. Although it is desirable to give the interviewee, and his
supervisors, the courtesy of recording their comments, it is necessary
to insure that the content of the job analysis report will not adversely
influence proper interpretation of the material. The General Comments
section serves this purpose. The comments of incumbents are recorded
and may be examined later. This procedure separates subjective comments
from scientifically collected job data.

(d) Part IV - Equipment Information. (Sample is
attached as annex G.) Specific procedures for completing this form
follow:

1. Distribute the list to the job incumbents
chosen for interview and make appointments for interview and observation.

1-11

<u>2</u>. Direct the job incumbents to review the list with respect to their own job activities, and to indicate those pieces of equipment with which they are involved.

<u>3</u>. Direct at least one man to list the particular manuals or references which the station <u>uses</u> while working on the indicated equipment.

<u>4</u>. Request each man to add any equipment with which he is involved. Direct him to use the standard nomenclature and to describe any modifications which change the basic purpose, or capability, of the equipment.

<u>5</u>. Instruct the man to put his name, rank, and MOS on the list when he has finished the survey.

<u>6</u>. When interviewing the man, use the equipment list to establish what equipment is worked with during the performance of the various work activities.

<u>7</u>. When the particular interview and observation have been completed, the equipment list will be attached to the completed job analysis report for that individual. Be sure to complete and attach the part IV cover sheet. This will insure that the equipment list can be recovered if it becomes detached from the other parts of the report.

<u>8</u>. If the mission and organization of a particular station seems unique, use an equipment list to "pin down" all of the equipment which is used in support of the assigned mission. This list, if used, will be labeled clearly as a station-wide list so that it will not become attached to an individual job analysis report.

3. <u>Consolidating Job Data</u>. When analysis is performed for an overseas command, upon return to the continental United States, job analysis teams will consolidate individual job analysis reports into one master report.

a. Average indices describing the criticality or importance of each duty and task will be derived.

b. The frequency of activity with each item of equipment will be determined.

c. Duties, tasks, and elements performed will be consolidated, and a statement of the overall job, in terms of behavior, conditions, and criterion will be developed.

d. Duties not considered significant, and their accompanying task and element descriptions, will be listed separately.

4. <u>Analyzing and Reporting</u>.

a. <u>Analysis</u>. The data in the consolidated reports, as well as in the individual feeder reports, will be used by staff elements of HQ, USASA and the USASATC&S to analyze the differences which exist between what is done in the field, and what is provided for in regulatory controls and programs. Any problems which exist, or which could exist, should be explained by this comparison. During the analysis, the base data will be used to determine what should be done in the light of up-to-date field requirements and operations.

b. Reporting. Recommendations will be framed to implement either an expanded, or modified existing program, or as a recommended change to the existing program. These changes, if any, will be reflected in all organizational elements (i.e., G1, G2, G3, G4, Combat Developments Activity, and the School) which influence the respective operation. If accepted, these changes, or modifications, will be installed in all affected systems. Following staffing, these changes will be combined with the basic job analysis performance requirements, and when finally released, the end product will be an up-to-date and authoritative statement. Each staff element will use these statements as base data to guide its particular activities. The School and other training activities will use the job performance requirements as input to the development of instructional systems.

E. REFERENCES

1. Army Job Analysis Manual I, SOB Report No. 1-70-OR, Systems Development Branch, Research and Development Division, The Adjutant General's Office. Department of the Army, March 1960.

2. Legere, C.L. John, USASA Command Job Analysis System, Job Analysis Handbook and Guide, 2d ed., Evaluation Unit, US Army Security Agency Training Center and School, Fort Devens, Massachusetts, January 1966.

ANNEX A

OUTLINE PROGRAM OF INSTRUCTION

Command Job Analysis Teams

	Subject	Time Allocation (Hours)
First Day	Introduction, Greetings, and Administrative Matters	2
	Mission and Functions of Job Analysis Teams	1
	Overview of the Process of Job Analysis	1
	The Preparation Phase of Job Analysis	1
	Review and Integration of Learning	1
Second Day	Study of TDA's of Units to be Visited	½
	Preliminary Activities of Teams Upon Arrival at Unit	1
	Preparation of Briefings	1
	Review of Briefings	1
	Analysis of a Job	1
	Techniques of Interview	1
	Techniques of Observation	1
	Review and Integration	1
Third Day	Observation Practical Exercise	1
	Introduction to Standard Job Analysis Forms	1
	Interview Practical Exercise	1
	Identification of Functional Areas in Unit Analysis	1

	Subject	Time Allocation (Hours)
Third Day (cont)	Examination of Data Collected During Interview and Observation	1
	Presentation of Trip Itinerary	1
Fourth Day	End Product Reports	1
	Format of Prestructured Data-Gathering Forms	1
	Prestructuring Activities	6
Fifth Through Ninth Days	Complete Prestructuring of Data-Gathering Forms	35

ANNEX B

DAILY SCHEDULE FOR CONDUCT OF COMMAND JOB ANALYSIS SYSTEM

Note: If the Command Job Analysis Team arrives after
noon of the first day, then the second actual
day at a station should be considered as the
first day.

First Day:

1. Command Job Analysis Team Briefing for Unit Commander

2. Command Mission Briefing for Job Analysis Team

3. Tour of the Facilities

4. Unit Analysis Interviews with Operations Officer

5. Identification of Major Work Areas

Second Day:

1. Briefing of Maintenance Staff (including conference on duties
   located and "laying on" interview requirements)

2. Study of Nominee Records

3. Selection of Job Analysis Incumbents

4. Study of Operations Area to Identify Environmental Conditions

5. Briefing of Job Incumbents

6. Setup of Interviews

7. Distribution of Equipment Lists for Completion by Incumbents

Third Day:

     1. Interview

     2. Observation

     3. Interview

     4. Observation

     5. Etc.

Fourth Day:

     1. Interview

     2. Observation

     3. Interview

     4. Observation

     5. Etc.

     6. Finalization of Reports

     7. Arrangements for Reinterviews

Last Day:

     1. Job Incumbent Reinterview

     2. Job Incumbent Reobservation

     3. Setup of Supervisor Exit Interview

     4. Exit Briefing

ANNEX C

USASA COMMAND JOB ANALYSIS SYSTEM

UNIT ANALYSIS

Official Command Designation _____

Unit Name _____

Geographic Location _____

Date of Visit _____

Functional Work Area Investigated _____

Commander _____

Deputy _____

Executive Officer _____

Operations Officer _____

Job Analysis Team Chief _____

Number of Job Analysis Reports Completed at this Station _____

Current TDA   Title _____

                 No.   _____

                 Date _____

       Latest Change   _____

MISSION INFORMATION

1. Mission of the station: (If possible attach a copy of the mission briefing.)

    a. Overall description of the mission: (Including nationality of target.)

    b. Types of targets:

    c. Types of positions used in support of the mission: (Include the number.)

    d. Category of positions:

        Category A _____

        Category B _____

        Category C _____

        Category D _____

e. Tasking direction:

    (1) Given.

    (2) Received.

    f. Special "problem areas" mentioned by the commander and his staff:

ORGANIZATIONAL INFORMATION

2. Organization of the Unit/Station: Complete the organizational chart with the titles and names of the personnel filling the jobs. Additional blocks should be added as required.
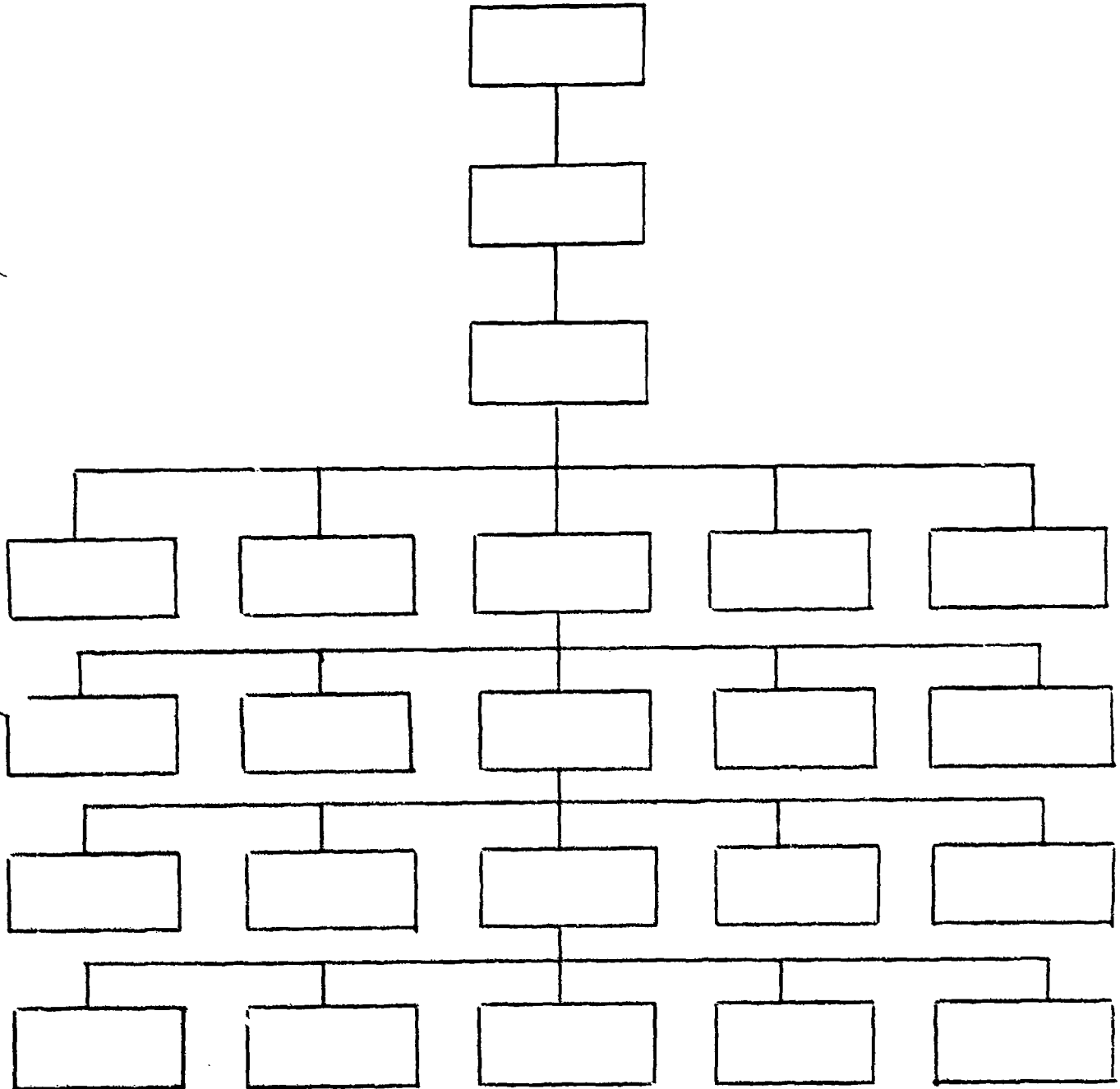
ANNEX C (cont)

3. Personnel composition of the unit:

Check Presence	Number		Remarks
	Auth	Actual	
MOS Code			
ADDITIONAL			

4. CJA unit analysis guide:

FUNCTIONAL AREA	Mission activity (Y or N)	No. of Personnel involved	Percent of mission	MOS of personnel involved

1.
    a.
    b.
    c.				

2.				
3.				
4.				

5.
    a.
    b.
    c.				

6.				
7.				

ANNEX D

JOB ANALYSIS REPORT

PART I

IDENTIFYING INFORMATION

Name _____ Rank _____ MOS _____

Date _____ Station _____

Job Analyst _____

ANNEX D (cont)

USASA COMMAND JOB ANALYSIS

A. **Approvals:**

Job Analyst _____ Date _____

OIC _____ NCOIC _____

Trick Chief _____ Room Supv _____

===

B. **Identifying Information:**

1. Name _____ Rank _____ Svc No. _____

2. Position Title:

   a. _____
      (Official classification code and MOS title - AR 611-202)

   b. _____
      Duty MOS (As authorized by TDA)

   c. _____
      (Alternate or "working title")

3. Unit Designation and Location:

   a. _____
      (Official designation of unit)

   b. _____
      (Geographic location)

   c. _____
      (Official designation of subdivision)

4. Organizational Information:

   a. Mission of Job Incumbent's Section:

      (1) Overall description of mission:

1-25

(2) Position designations: (equipment configuration)

b. <u>Specific Organization of Subdivision</u>: (Draw organizational
chart and insert the names of personnel filling the jobs. Star (*)
the position of the individual being analyzed.)

c. <u>Personnel Composition of the Subdivision</u>:

	Check Presence	Number		Remarks
		Auth	Actual	
MOS code				
ADDITIONAL				

ANNEX E

JOB ANALYSIS REPORT

PART II

DETAILS OF DUTIES, TASKS, AND ELEMENTS

Name _____ Rank _____ NOS _____

Date _____ Station _____

Job Analyst _____

1-28

OUTLINE OF DUTY

12 TASKS

DUTY TITLE: 12 PROCESS

TASK TITLE:

1201 Scan
1202 Transcribe/Translate
1203 Summarize/Consolidate
1204 Validate
1205 Format
1206 Operates Processing Equipment

DUTY BEHAVIOR STATEMENT SHEET

DUTY TITLE: 12 PROCESS	Yes	No	Im-port-ance	Percentage Time		Actual Time
DUTY BEHAVIOR: Performs intermediate processing of collected material.						

DUTY CONDITION: (Given)	SUPERVISION:	A	B	C	D

TOOLS/MATERIALS:

EQUIPMENT:

REFERENCES:

NOT GIVEN:

CRITERION:

1. Procedures must be in accordance with _____.

2. Work activity must be accomplished in _____. (minutes/hrs/days)

3. Work product must be in accordance with specifications outlined in

4.

5.

ANNEX E (cont)

DUTY CONTINUATION SHEET

This work activity is also performed on/with the following equipment:

Equipment	Change in Condition	Criterion Document	
		Procedure	Characteristics

TASK BEHAVIOR SHEET

TASK TITLE: 1201 SCAN	Yes	No	Im-port-ance	Percentage Time	Actual Time
TASK BEHAVIOR: Scans collected material for items of importance.					

TASK CONDITION: (Given)	SUPERVISION:	A	B	C	D

TOOLS/MATERIALS:

EQUIPMENT:

REFERENCES:

NOT GIVEN:

CRITERION:

1. Procedures must be in accordance with _____.

2. Work activity must be accomplished in _____. (minutes/hrs/days)

3. Work product must be in accordance with specifications outlined

    _____.

4.

5.

ELEMENT RECORD SHEET

DUTY TITLE: PROCESSES

Task Number : 1201 Scan

Element Behavior	Unique condition	Unique criterion

ANNEX F

JOB ANALYSIS REPORT

PART III

GENERAL INFORMATION

Name _____ Rank _____ MOS _____

Date _____ Station _____

Job Analyst _____

DEFINITIONS

List any terms which the job incumbent uses during the interview or observation which should be clarified when the results of this job analysis are read.

ENVIRONMENTAL CONDITIONS

Describe the environment of the job incumbent whose work activities are described in this report. This description should include all of the surrounding factors which influence the performance of the job.

GENERAL COMMENTS

Record all comments received from members of the subdivision staff which are related to the job activities performed by the job incumbent. Both positive, and negative comments should be included. Wherever possible, collect not just a complaint, but a recommended solution.

ANNEX G

JOB ANALYSIS REPORT

PART IV

EQUIPMENT INFORMATION

Name _____ Rank _____ NCS _____

Date _____ Station _____

Job Analyst _____

ANNEX G (cont)

EQUIPMENT INFORMATION

	Reference	Operate	Supervise	Per cent of Worktime Involving this Equipment
1. Radio Sets				
AN/TLR-28				
AN/PGC-58X (Teletypewriter sets)	TM 11-5815-263-12,			
AN/PGC-25X (Teletypewriter sets)	5815-244-12			
AN/UJQ-3				
AN/TLA-9				
AN/MPQ-24	Manufacturers manual plus manuals for AB equipment			
AN/UPA-2/V2	TM 11-5895-218-10			
AN/APA-74				
AN/ULR-13				
AN/TRQ-22				
AN/TCC-26				
AN/TCC-13				
AN/GRC-64				
AN/PRD-7				
AN/TLR-8				
AN/PRD-6				
AN/FLR-8	EDL Manual			
AN/VRC-15	TM 11-291			
AN/APR-9 (P/O AN/ALR-8)	TM 11-5895-216-10			
AN/APR-13 (P/O AN/ALR-8)	TM 11-5895-216-10			
AN/TRD-20				
AN/APA-69	TM 11-5826-203-15			
AN/PRD-1	TM 11-677			
AN/TCC-7 (Telephone terminal)	TM 11-2139-10			
AN/ASA-34 (Recording set)	TM 11-5895-331-20			

IMPORTANCE CODES AND LEVELS OF SUPERVISION

1. <u>Importance Codes for Duty Behavior Statement Sheet</u>.[1]

    a. <u>Importance Code 1</u>. This duty is <u>not</u> recognized as one of the incumbent's principal responsibilities. It occupies a minor portion of his total work activity.

    b. <u>Importance Code 2</u>. This duty is recognized as one of the incumbent's principal responsibilities. It occupies a reasonably large portion of the incumbent's total work time and occurs with reasonable frequency in the job cycle.

    c. <u>Importance Code 3</u>. This duty is recognized as a principal responsibility of the job incumbent, occupies a major portion of his time, and occurs frequently during the work cycle.

    <u>Note</u>: The percent of time this duty (or task) occupies in a typical work cycle is determined and entered in the appropriate block. If a work cycle takes three hours, and the man spends one hour performing the duty (or task) being analyzed, then 33-1/3% would be entered in the "Percentage Time" block. Work cycles vary considerably. For this reason, the actual time is recorded in the last block. This provides a validity index for the "Percentage Time" section, and allows for more flexibility in the treatment and consolidation of the resultant data.

2. <u>Levels of Supervision</u>[2]

    a. <u>Supervision Level A</u>. This is the most detailed level of supervision. The supervisor provides detailed instructions concerning <u>which</u> work activity to perform, and <u>how</u> to perform it. The job incumbent is not permitted to proceed to any new area of activity until further instructions have been given. The supervisor provides all necessary tools, materials, and references, or specifies which will be used for a given job. The job incumbent is not permitted to make judgments concerning additional requirements and is not permitted to proceed independently.

    b. <u>Supervision Level B</u>. This is a less detailed level of supervision than Level A. The supervisor provides specific tasking concerning <u>which</u> task or duty to perform, but depends upon the incumbent to determine <u>how</u> to do the work. The job incumbent selects his own tools, materials, and references to do the work. The supervisor is available for consultation regarding <u>how</u> to do the work.

    c. <u>Supervision Level C</u>. This is a broad, permissive level of supervision. The supervisor assigns a job incumbent to a broad area of work activity and permits the individual to decide <u>which</u>

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[1] Army Job Analysis Manual, <u>op. cit.</u>, p. 26.
[2] C. L. John Lagere, <u>op. cit.</u>, p. 7.

specific activity, within the broad area, must be performed, and in which _priority_ they must be performed. The job incumbent determines _how_ to perform these activities and selects his own tools, materials, and references to do the work. The supervisor is available for consultation regarding _which_ job to do and _how_ to do the work.

    d. _Supervision Level D_. This is an independent level of operation. The job incumbent is assigned to a broad, all encompassing area of functional responsibility and must determine _which_ jobs must be performed, and _how_ they should be performed. The job incumbent is subject to routine staff and regulatory controls, but is independently responsible for activity within his functional area. The responsibilities within this level will usually include the necessity to supervise others.

CHAPTER 2

INCORPORATING OPERATIONAL DEVELOPMENTS

A. INTRODUCTION

1. _Purpose_. A completed job analysis schedule describes the duties, tasks, and elements performed by incumbents of an MOS at the time the job analysis is made. For this reason, a job analysis presents a picture of a job as it _exists_, not as it _should be_ or _may become_. If a training program is based exclusively on data derived from periodic job analyses, it may include instruction that will be unnecessary or obsolete by the time the student is assigned to the job in the field. Similarly, the training will not include instruction in new duties and tasks or changes in equipment, procedures, or techniques that have occurred since the last job analysis was performed. Therefore, in addition to the data derived from job analysis, careful consideration must be given to the probable impact of evolving organizational systems, new concepts of operation, doctrinal changes, and new equipment, material, and techniques. This chapter defines responsibilities and procedures for identifying, collecting, and processing material and documents relating to these changes to insure that, when appropriate, they are incorporated into the training objectives of the MOS affected.

2. _Sources_.
    a. The primary sources of data pertaining to operational developments are reports of combat development field experiments, combat development studies, staff and faculty position papers and memorandums, service tests, troop tests, and user tests. In addition, records, reports, and plans available from ASA units frequently contain doctrinal data which have implications for school training.
    b. Secondary sources of data pertaining to operational developments are military service schools, the Signal Corps, the Combat Developments Command, colleges, universities, and technical schools, and other nonprofit educational agencies and research organizations. In addition, manufacturers of equipment and aids, publishers of instructional materials, and distributors of equipment, aids, and instructional materials sometimes provide data which have implications for school training.

3. _Definitions_.
    a. _Doctrine_. A compilation of the principles, policies, techniques, and/or procedures by which the Armed Forces or elements thereof guide their actions. It is derived from approved developmental concepts, experience, or theory, and represents the best available thought that can be defended by reason. It is taught authoritatively as guidance but requires judgment in application.

b. Combat Developments. The formulation of new Army doctrine, organizations, materiel objectives and requirements, and the early integration of the resulting products into the Army.

c. Combat Development Field Experiment. A field trial, usually conducted under controlled conditions, designed to collect data on operations, organizations, and materiel for use in developing or evaluating new or improved operational and organizational objectives or concepts, tactics, techniques, procedures, qualitative materiel development objectives, or qualitative materiel requirements.

d. Combat Development Study. A study directed at the determination of new or improved operational and organizational objectives and concepts, tactics, techniques, procedures, qualitative materiel objectives, or qualitative materiel requirements.

e. Service Test. A test of an item, system, materiel, or technique conducted under simulated or actual operational conditions to determine whether the specified military requirements or characteristics are satisfied.

f. Troop Test. A test conducted in the field for the purpose of evaluating operational or organizational concepts, doctrine, tactics, and techniques, or to gain further information on materiel.

g. User Test. A test performed under operational or simulated operational conditions to determine the military suitability of an item.

B. PROCEDURES

1. Identifying Developmental Data. The Office of Training Literature will identify developmental data which have implications for training. However, all academic and staff elements will assist in the location and identification of new developments within their areas of interest. To insure that developmental or doctrinal material receives timely consideration for inclusion in school training programs, the following procedures will be followed:

a. The Assistant Commandant will provide overall supervision of the USASATC&S response to those elements of the USASA Developments Program which have implications for school training, in addition to approving all changes to programs of instruction (POI).

b. The Technical Consultant will provide advice and assistance to the Director, Office of Training Literature in the identification of new developments. He will review material upon request of Director, Office of Training Literature.

c. The Director, Office of Training Literature will establish the necessary internal procedures to locate and obtain developmental and doctrinal material in selected publications of the following types:

(1) Department of the Army official and unofficial publications.

(2) Department of Defense publications.

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(3) Publications of all cryptologic services.

(4) Publications and reports produced by industrial concerns in connection with government contracts.

(5) Research reports from any available source.

In addition, the Office of Training Literature will review and coordinate the review of publications and documents to identify doctrinal or developmental data; furnish material which has training implications to the Chief, Evaluation Unit for information and action; and review lesson plans, training aids, and instructional material for doctrinal accuracy. When necessary, the Office of Training Literature will also furnish material which may require changes in current POI to the Assistant Commandant; Chief, Evaluation Unit; and the Director of Instruction.

d. The Chief, Evaluation Unit will select those appropriate developments to be incorporated in school training, and recommend to the Assistant Commandant, in coordination with interested staff and faculty, the material to be included in the revised POI and the effective date of the change.

e. The Director of Instruction will designate reviewing officers within the academic elements for those publications referred to his office for review, and advise the Office of Training Literature of the disposition of all such developmental and doctrinal material. The Office of Training Literature will be the office of record for all developmental and doctrinal material received or developed at the School.

f. Academic and staff elements will be constantly alert to identify doctrinal and developmental material in their areas of interest. Some sources of data are:

(1) Technical publications.

(2) Attendance at meetings, conferences, exhibitions, and seminars.

(3) Visits to, and correspondence with, ASA units.

(4) Participation in field exercises.

(5) Reports of oversea returnees.

Academic and staff elements will inform the Director, Office of Training Literature of doctrinal or developmental changes when such material is routed directly to the departments concerned; review doctrinal or developmental material received from the Director of Instruction and provide comments to him, and to the Director, Office of Training Literature; and incorporate doctrinal and developmental material into appropriate POI as directed by the Director of Instruction.

2. Preliminary Review. When developmental or doctrinal material has been identified, the following procedures will be followed:

a. If identified by Office of Training Literature -

(1) At least one copy of the document describing the development or change will be obtained for local review.

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(2) A preliminary review and evaluation of the applicability of the material will be conducted by the Office of Training Literature.

b. If identified by academic or staff elements, a copy will be forwarded to the Office of Training Literature for review.

3. **Disposition of Material**. Where preliminary review so indicates, Office of Training Literature will:

a. Produce or obtain additional copies of the material.

b. Distribute copies of the material for review and comment as follows:

(1) Technical Consultant - 1 copy.

(2) The Director, Academic Department or staff element concerned - 2 copies.

c. Forward, upon receipt of the comments of the Technical Consultant and the Director, Academic Department or staff element concerned, one copy of the material, together with the comments of the reviewers, to Chief, Evaluation Unit.

4. **Incorporating New Developments**. Chief, Evaluation Unit will:

a. Review the documentary material and the comments of staff and faculty reviewers.

b. Apply appropriate selection criteria to determine whether the development should be incorporated into the training program. (See chapter 3).

c. If an affirmative decision is made, develop a list of training objectives and submit to:

(1) The Director, Office of Training Literature for a check of doctrinal correctness.

(2) The Director, Academic Department concerned for a check of technical accuracy.

d. Add these objectives to the list of training objectives derived from job analysis.

e. Follow established procedures necessary for translating these objectives into performance terms and the continuation of the course development cycle. (See chapter 4.)

f. Establish, in coordination with the academic element concerned, the effective date for inclusion of the new material in appropriate POI.

5. **Quarterly List**. Chief, Training Publications Division, Office of Training Literature will publish, and distribute to all academic and staff elements, a quarterly list of all material received.

C. REFERENCES

1. AR 71-1.

2. AR 70 series relating to combat developments.

3. AR 350-5.

4. USASA Reg No. 70-2

CHAPTER 3

SELECTING TRAINING OBJECTIVES

A. INTRODUCTION

1. **Purpose.** The selection of objectives is a judgmental proce-
dure which involves close scrutiny, by qualified personnel, of the full
range of job duties, tasks, and elements performed by incumbents of an
MOS and detailed in job analysis schedules. The purpose of this chap-
ter is to provide general principles, criteria, and procedures which
will function as guides for the selection of appropriate training objec-
tives and for the assignment of priorities to these objectives.

2. **Importance.** Job analysis schedules prepared by Command Job
Analysis Teams detail the full dimensions of an Agency job to include
all of its variations caused by the mission and the product, and by
geographical, procedural, and environmental conditions. It would be
extravagant, in terms of time, personnel, money, and other resources
to provide the kind and amount of training required to equip each grad-
uate of the training system to perform every job task of a particular
MOS in any position in the world. For the same reason, it is often
impractical to initially train personnel to the ultimate level of pro-
ficiency required at some future station. Some training is more real-
istically and more economically beneficial when conducted on the job.
Consequently, it is essential to select from the total list of job per-
formances those which are most appropriate for formal School training
and to decide what standards or level of proficiency will be required
for successful course completion.

B. OBJECTIVES OF THE SELECTION PROCESS

1. **General.** The process of selecting training objectives must
achieve the overall objectives of economy of resources, feasibility,
and effectiveness in meeting job requirements.

2. **Specific Objectives.** The selection process must be designed
to accomplish the following:
      a. Identify job elements which are appropriate and feasible
for School training.
      b. Identify job elements which are appropriate and feasible
for on-the-job training.
      c. Identify job elements which are appropriate and feasible
for follow-on training; i.e., advanced training for selected graduates
at NSA, by industrial concerns, or at the USASATC&S.

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d. Specify the training priorities of specific job duties and tasks.

C. CRITERIA FOR SELECTING TRAINING OBJECTIVES

The following criteria are guides for the selection of objectives appropriate for school training. It should be noted that it is not essential that all criteria be met as a prerequisite for including any single job task or element in the list of training objectives for a course. In many cases, meeting a single criterion is sufficient justification for including the element in the list of training objectives.

1. Universality. This criterion directs that emphasis should be placed on the development of job skills and their associated knowledge supports and emotionalized controls (ideals, attitudes, interests, and appreciations) which are used by personnel in the MOS regardless of where they are assigned. That is, the job element is required for acceptable job performance at all units. In essence then, the criterion of universality asks the questions:

a. Where is this skill or knowledge used? In which positions?

b. Does it have wide application? (If it occurs only in a few locations, it may be an appropriate objective for follow-on training of some type.)

c. Is it so unique that it was infrequently found in the job analysis schedules? (If it is truly unique, the likelihood is that it should be taught on the job.)

2. Difficulty. The criterion of difficulty specifies that emphasis in a training program should be placed on content or skills which are so difficult to learn that it is highly unlikely that job incumbents can acquire them on their own. Or, the skill is so difficult to learn that it requires intensive formal training, conducted by competent instructors, to acquire the needed level of proficiency. For example, although it is conceivable that an individual could learn to read schematics on his own, it would be a lengthy trial-and-error process. In other cases, danger to the man or hazard to equipment would result from the unguided efforts of a neophyte to learn on his own. Therefore, the criterion of difficulty asks the following questions:

a. Is the skill or concept difficult to acquire?

b. Are personnel likely to learn this skill on their own with minimum danger to themselves, equipment, or materials?

3. Cruciality. This criterion points to the need for selecting skills and knowledge supports which are critically essential to acceptable job performance when needed, even though the tasks may not be performed frequently. For example, consider the case of the electronics equipment operator. More and more equipment is being transistorized and

is therefore less subject to malfunction. This fact should reduce the amount of maintenance training that an operator requires. However, there may be a number of malfunctions which, although occurring very infrequently, would be extremely critical if they happened, and immediate corrective action were not taken by the operator. Severe damage to the equipment, materials, or products might be the result. Under such circumstances, the criticality of the infrequently used skill is so great that the training must be provided. In summary, the criterion of criticality asks the following questions:

     a. How important is the skill when it is called for?

     b. What is the impact on the mission, the operation, the product, the equipment, or the operator when the required skill is not present?

    4. **Frequency.** This criterion draws attention to the need for emphasizing in training those skills which are used most often on the job. A skill which is used frequently, even though it may be acquired on the job, may warrant formal School training under certain conditions. For example, it is often more economical in time and materials to teach a skill rather than to allow personnel to learn it by trial and error. It is also true that providing instruction results in more efficient and standardized performance, and consistently higher quality in products or services. The criterion of frequency, then, involves the following questions:

     a. How often must the job incumbent perform this task?

     b. Is it done often enough to warrant training?

     c. Is there a known "best way" to do it?

     d. Should the method of performing the skill be standardized?

    5. **Practicability.** This criterion points to the need for determining whether the time, effort, money, and other resources required to develop the skill are commensurate with the gains in job proficiency attained by trainees; this is the "Is it really worth it?" criterion. Although it is possible to train personnel to perform any job function, the question often arises as to whether the cost of the training can be justified in terms of improved performance. If the proficiency of School-trained men in performing a skill is only slightly higher than that of an individual trained on the job (or self-taught), the practicability of providing formal training is open to serious question. Realistically, training should result in a significantly higher level of performance or a measurably greater degree of skill than can be attained otherwise. For example, training in typing is usually accepted as a suitable skill for formal instruction. However, it is undoubtedly true that there is a "break-even" point in typing training. This is the point at which a further investment in training results in proportionately less improvement in typing skill. Probably there is a level of skill, which might be stated in the number of words per minute with a maximum allowable number of errors, which could be justified in terms of costs. But, to continue formal training beyond this level would result in investing more than the anticipated gains are worth. The higher standard might be a proper goal for on-the-job training.

6. **Achievability**. This criterion directs attention to the need for considering whether an objective is attainable in terms of the level of skill required, the aptitude and intelligence of the student input to the training program, and the resources available. Objectives must be compatible with the abilities and aptitudes of the students, as well as with the requirements of the job. To set standards of accomplishment which are beyond the reach of any sizeable percentage of the student group is unrealistic -- and expensive in terms of attrition from the training program. For example, referring back to the typing situation, interview of supervisory personnel may indicate production could be speeded up and efficiency improved if clerk-typists were able to type at a rate of 120 words per minute. Yet, this level of proficiency would be unrealistic. Very few students would be able to attain the standard. In summary, the criterion of achievability asks the following questions:

a. Can the majority of enrollees meet the standard prescribed by the objective?

b. Do they have the aptitude, intelligence, maturity, motivation, or the experience required to attain the desired standard?

c. Can they achieve the standard in a reasonable period of time?

7. **Quality**. This criterion underscores the need for selecting for instruction those skills which are more useful to men of "average" proficiency than to those demonstrating "mediocre" or "outstanding" proficiency in the job. In other words, the objectives selected should reflect acceptable skills and standards rather than those which either fall short of acceptability or clearly exceed job requirements. To train individuals at a level of achievement which is less than that required on the job is to place an unnecessary burden on supervisory personnel for on-the-job training. In such cases, the training program is not serving the enterprise as it should. On the other hand, it is wasteful to train individuals, or to attempt to train them, in skills and at levels of achievement which are characteristic of only the outstanding performers. The investment of training resources will be heavy, and the number of individuals who complete the training successfully will be few. In summary, the following questions relating to the criterion of quality should be asked:

a. Is this skill required?

b. Is this level of proficiency demonstrated by "average-satisfactory" performers?

8. **Deficiency**. This criterion directs that training should be given in those essential job skills in which job incumbents frequently demonstrate inadequate performance. In any job, there are tasks which are more difficult to accomplish (or easier to bungle) than other aspects of performance. By tabulating the judgments of supervisory personnel regarding the difficulties or weaknesses of their subordinates, an inventory of deficiencies can be produced. These items, regardless

of their criticality, might well appear as points of emphasis in a
listing of objectives. For example, if equipment-down time is caused
by faulty soldering by repairmen, this skill might well require addi-
tional emphasis in a list of objectives for the training of repairmen.
In summary, this criterion poses the following questions:

      a. What skills are frequently performed poorly (or not at all)
by personnel in this job?

      b. Which aspects of the job require emphasis due to mistakes
made by a sizeable percentage of job incumbents, or their display of an
unacceptable proficiency level?

    9. <u>Retainability</u>. This criterion directs attention to the need
for considering the time interval between completion of training and
use of the skill on the job. Here, the determining factor is the pre-
dicted (or measured) amount of deterioration of the skill that will take
place during that time interval. The degree to which a skill degenerates
through disuse, and the time over which the deterioration takes place,
should play a large part in determining the level of performance required
for successful course completion. In turn, the desired level of attain-
ment will determine the amount of time and emphasis given to the develop-
ment of the skill. Some skills degenerate rapidly; others deteriorate
slowly or not at all. Of course, this criterion is closely related to a
few others, notably "frequency" and "criticality." Judgment must be
exercised in arriving at a determination as to whether the skill should
be taught until its use is imminent. If a decision is made to teach the
skill, then the amount of emphasis, practice, and maintenance training
required for retention of the skill at the required level must be deter-
mined beforehand. For example, the ability to send and receive Morse
code are relatively difficult skills to acquire. If the skills are not
used, a certain amount of deterioration is certain to occur. If the
skills are only rarely needed by personnel, it may be wise to train only
a few communicators. However, if a decision is made to train all per-
sonnel as communicators, higher levels of initial proficiency in Morse
code sending and receiving will be required to absorb the deterioration
of the skills which is certain to occur in that all trainees will not
use this knowledge immediately in the field. By increasing the standards
for School training, an acceptable level of proficiency, even following
disuse, can be assured.

    10. <u>Follow-on Training</u>. This criterion points to the need for con-
sidering both the kind and the amount of training which will be given to
personnel following the completion of School training. Follow-on train-
ing may take the form of advanced formal training or on-the-job training.
A training program must dovetail with any following training. Prospec-
tive graduates must be brought to the level of proficiency required to
undertake either advanced training or on-the-job training with reasonably
good chances for success in the program. Those of us who plan the School
program must know the entrance requirements of the follow-on training;
and those who plan the follow-on training must know the minimum levels

of proficiency achieved by the students in the basic training program. In short, initial training programs and follow-on training programs must mesh to prevent unnecessary costs. In summary, the criterion of follow-on training involves these questions:

a. What level of proficiency is needed for a graduate of the initial program to undertake either advanced or on-the-job training with better than an even chance of success?

b. What should the planner of the follow-on training program be able to count on in in terms of previous kinds and levels of skills achieved by the personnel assigned to his program?

D. PROCEDURES

1. Preliminary Review and Analysis. Chief, Evaluation Unit will insure that evaluators assigned the task of selecting training objectives use the following procedures:

a. Review all job analysis schedules prepared for the MOS under consideration and note similarities and differences.

b. Study the consolidated job analysis report for the MOS and insure that it:

(1) Lists job tasks common to all schedules prepared for the MOS. (The job elements which comprise each selected task are automatically included as training objectives.)

(2) Omits all unique or mission-oriented job tasks.

c. If omissions are found in sections B and C of the consolidated job analysis schedule, prepare a list of the missing items.

2. Initial Selection. Evaluators will perform initial selection of objectives as follows:

a. Using the Training Objectives Worksheet (annex A), list all of the duties and tasks contained in section C of the consolidated job analysis schedule and enter the additional items from the separate listing of omitted job tasks.

b. Apply the criteria defined in section C of this chapter to each item in the list of duties and tasks. Place a check mark in as many of the columns 2 through 11 as are applicable.

c. Establish training priorities for each major task. Indicate the priority of each task by assigning a priority number in column 12.

3. Final Selection. Final selection of training objectives will be accomplished as follows:

a. Completed Training Objectives Worksheets will be submitted by evaluators to other Evaluation Unit personnel and to qualified instructors in the academic departments for review.

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b. When all forms have been reviewed, Chief, Evaluation Unit will call a meeting of all participants in the selection process to "iron out" differences regarding the selection of objectives and their priorities, and to reach a consensus on the inclusion of specific duties and tasks and their respective priorities.

c. Following the meeting, Chief, Evaluation Unit will prepare a final list of training requirements, in the order of their priority, and staff for comment/concurrence to the following:

(1) Technical Consultant.

(2) Educational Consultant.

(3) Director of Instruction.

(4) Assistant Commandant.

d. Upon receipt of concurrences in the priority listing of objectives, Chief, Evaluation Unit will draft performance objectives (See chapter 4.)

E. REFERENCES

1. _Army Job Analysis Manual I, SOB Report No. 1-60-94_, Systems Development Branch, Research and Development Division, The Adjutant General's Office, Department of the Army, March 1960.

2. Melching, W. H. et al, _The Text of an Orientation Workshop on Automated Instruction_, The George Washington University Human Resources Research Office, Washington, D.C., July 1962.

3. Melching, W. H. et al, _A Handbook for Programmers of Automated Instruction_, The George Washington University Human Resources Research Office, Washington, D.C., September 1963.

Annex A
TRAINING OBJECTIVES WORKSHEET

Major Duties and Tasks	Criteria										Priority
	Universality	Difficulty	Cruciality	Frequency	Practicability	Achievability	Quality	Deficiency	Retainability	Follow-on Training	
1	2	3	4	5	6	7	8	9	10	11	12

CHAPTER 4

WRITING PERFORMANCE OBJECTIVES

A. INTRODUCTION

1. **Purpose.** Part of the waste that occurs in training is directly due to the fact that objectives, ever if valid, have not been stated in terms which permit the development of optimally efficient courses of instruction. Too often, the objectives of training programs have been stated vaguely. Typically, statements of objectives have been worded "to provide the student with a general knowledge of...," or a "working knowledge of...," or an "understanding of..." Statements such as these are open to any number of different interpretations; therefore, they do not provide the direction and guidance required to develop instructional materials or to construct valid criterion measures. If precise training is to be provided, objectives must describe clearly what the man must be able to do, the conditions under which he must be able to perform, and the standard or criterion of acceptable performance at critical points during the development of job skills and at the end of the training program. The basic purpose of this chapter, therefore, is to describe how objectives can be set forth precisely and unambiguously.

2. **Essential Properties of Functional Objectives.**
   a. **Minimal Interpretation.** A useful objective pictures clearly and concisely the learner demonstrating a specific desired behavior or behavior pattern. It must be a literal picture of performance which will be interpreted in the same sense by all training personnel in planning and conducting training activities.
   b. **Clear Expression.** As in any communication media, the primary problem in writing objectives is to provide a common base of interpretation for a variety of readers. Vague or loaded words such as "know" or "appreciate" must be consciously avoided in favor of more explicit terminology. Again, the intent is to picture the student behaving or performing specific actions within desired parameters. If he must "know" something, what is the demonstrable behavior involved? In a more precise sense, is our objective really to enable him to write something based upon gained knowledge; or perhaps to construct, or rearrange, or compare certain variables utilizing a knowledge of certain principles? The requirement for clear expression is, in effect, a demand for objective, action-framed statements which draw a picture of the student behaving as a result of teaching. Consider the following examples of vague terms in Group 1 and the clearer expressions of instructional goals listed in Group 2.

Group 1: Vague Terms	Group 2: Behavioral Terms
To provide a general knowledge of....	To calculate....
To provide a working knowledge of....	To repair....
To qualify....	To adjust....
To know about....	To modify....
To understand....	To classify....
To develop an appreciation for....	To install....
To be familiar with....	To construct....
To orient....	To select....
	To differentiate....
	To equate....
	To assemble....
	To rearrange....
	To organize....

3. Characteristics of Performance Objectives.[1] A performance objective is a statement which clearly communicates an instructional intent; that is, it describes a proposed change in the behavior of a student. Performance objectives have three essential characteristics.

a. They Identify the Terminal Behavior. The statement of an objective must identify exactly what the student must be able to do at the end of an instructional unit or complete course of instruction to demonstrate that he has achieved the required behavior. The learned behavior may involve the application of specific knowledge or the demonstration of a specific skill or constellation of skills.

b. They Describe the Conditions of Performance. The statement of a performance objective must describe clearly and completely the conditions under which the student must be able to demonstrate the behavior. That is, the "conditions" part of an objective identifies what the man will be given to do the job (tools, equipment, job aids, references, materials), what he will be denied (tools, equipment, etc.), what assistance he will have if any, what supervision will be provided, and the physical environment in which he must perform (climate, space, light, etc.).

c. They Set a Criterion of Acceptable Performance. The statement of a performance objective must describe how well the student must be able to perform. The criterion or standard establishes the minimum performance requirements for a job duty, task, or element. To do this, the objective statement must prescribe the quality of the work product or service produced (accuracy, completeness, clarity, tolerances, etc.): the quantity of work products produced (the number of work units completed); the time allowed to complete the job, duty, task, or element; or a combination of quality, quantity, and time standards.

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[1]Robert F. Mager, Preparing Objectives for Programmed Instruction, Fearon Publishers, San Francisco, 1962, p. 12.

4. Uses of Performance Objectives. Performance objectives provide the basis for all of the remaining steps in the development of an instructional system. They also serve other administrative and training purposes. Some of the more important uses of performance objectives are as follows:

a. To Enable the Selection of Appropriate Course Content. Well stated performance objectives provide a practical and objective means of determining what specific facts, principles, and elements of skill must be included in a course of instruction. They take much of the guesswork out of deciding what content is pertinent and what is extraneous.

b. To Permit the Selection of the Most Suitable Instructional Strategy. Performance objectives provide a clear description of job, duty, task, and element requirements. Because they avoid equivocation and ambiguity, the process of selecting the optimum method, medium, and system of organization is greatly simplified.

c. To Establish Clear-cut Instructor and Student Goals. Performance objectives permit both the instructor and the student to know precisely what is required of the student at the end of any instructional unit or complete course. This knowledge prevents gaps and unnecessary duplication in instruction, enhances motivation, and makes learning more effective.

d. To Provide a Firm Basis for the Development of Criterion Measures. Performance objectives are essential to the construction of valid and reliable criterion tests. True performance tests are difficult to construct under any conditions, but without well-stated performance objectives as a basis, the validity of criterion measures is likely to be questionable.

e. To Establish Go/No-Go Standards at Critical Points in a Course of Instruction. Performance objectives make it relatively easy to determine at what points in a course a student must demonstrate his acquired job knowledge and skills to be able to progress further in the course. Such actions as analysis of student difficulties, provision of remedial instruction, recycling, and elimination from the course are more easily and more objectively accomplished when performance objectives are available.

f. To Provide an Objective Basis for Evaluating Instruction. Performance objectives provide the ingredient that has been missing in monitoring programs -- agreement between the evaluator and the one evaluated as to what the instruction should accomplish. This fact permits objective evaluation of the instructional program in action.

g. To Provide a Realistic Basis for the Evaluation of School Graduates on the Job. It is impossible to obtain reliable judgments of the effectiveness of school-trained men in performing their technical duties unless there are firm and objective standards for evaluation. Performance objectives provide these standards.

h. To Establish Requirements for On-the-Job Training Programs. With performance objectives, field commanders have a clear picture of the knowledge and skills school graduates bring to the job. This facilitates the development of realistic on-the-job training programs.

B. WRITING PERFORMANCE OBJECTIVES

1. <u>Steps in Writing Performance Objectives</u>[1]
    a. <u>Identify the Performance Requirement</u>.
        (1) <u>Explanation</u>. The essence of a performance objective
is found in the description of observable, end-product behavior. Al-
though any number of ingredients contribute to any observable behavior,
i.e., knowledges, skills, attitudes, etc., it is important that these
elements be recognized as components of the instructional situation or
prerequisites to desired behavior rather than the goal behavior itself.
Performance objectives are, by definition, statements which describe
behavioral entities which are to become established either during or
at the end of a sequence of instruction and can be seen and measured as
such. Statements of desired behavior which meet this standard will pro-
vide a firm foundation for planning instruction and ultimately be the
criterion for determining whether the instruction has been successful.
        (2) <u>Examples</u>.
            (a) "To develop an understanding of the 407 Account-
ing Machine." This statement is difficult to interpret because it does
not picture the student displaying learned behavior at any point in the
sequence of instruction. Rather than outlining a definitive picture of
a learner doing something, it sketches an abstract state of mind which
in some way or another relates to an accounting machine. Although many
desired behaviors are by nature abstract, it is also true that these
behaviors have some outward manifestation which makes the cognition, or
understanding, or appreciation observable. If we attempt to determine
the real behavioral requirement, it might be established that the
learner really must be able to "identify by name each of the controls
located on the front panel of the 407 Accounting Machine," or "must be
able to construct an operational flowchart of the 407 Accounting Machine,"
or perhaps the learner "must be able to apply the principles of logical
trouble shooting to specified conditions of malfunction in the 407
Accounting Machine." Without emphasizing the obvious, it is apparent
that the latter statements are eminently more precise in communicating
the behavior the learner is really expected to acquire.
            (b) Another relatively common approach to the state-
ment of training requirements, particularly in the military, is found
in the use of such terms as "working knowledge;" e.g., the student must
have a working knowledge of the Radio Receiver R390/URR." Although the
phrase "working knowledge" contains a strong implication that some
definite actions are to be performed with the receiver, the statement
unfortunately does not provide the necessary information as to what

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[1]These steps should be used in writing objectives for all lesson plans.

these actions are. Is the working knowledge equated to an ability to operate the receiver, or does it mean that the student can <u>list</u> the operational characteristics or control parts or <u>diagram</u> signal flow through the components? Whatever the case, the objective must picture the learner doing something with or to the receiver as a result of instruction, as opposed to leading him into some vague intellectual state.

    b. <u>State the Required Conditions Accompanying the Behavior</u>.

       (1) <u>Explanation</u>. Another essential part of a complete and explicit statement of required behavior is the specification of conditions which are ordinarily present in the behavioral situation and which are, in fact, directly associated with the behavior. The conditions are environmental factors surrounding the behavior or resources the learner must use in the performance. The former encompasses such elements as climatic or geographic conditions such as temperature, humidity, light, location, terrain, distances, etc. The latter includes hardware or software, such as tools, references, guides, etc., and the critical element of supervision or assistance received. Some specific examples of conditions related to performance are:

        "Given tool kit X-3...."

        "Given standard reference 3-65...."

        "Given an electronic scope and standard test kit...."

        "Given: Fluctuating temperature range of 60° to 105°...."

        "Given the following: Altitude of 2,000 ft, mean atmospheric pressures of...."

        "With limited supervision (Level B)...."

        "Under continuous supervision (Level A)...."

        "Without supervision (Level D)...."

        "Without the aid of a table of cube roots...."

       (2) <u>Examples</u>.

        (a) <u>Example 1</u>. "The student must be able to calculate resistance, current and voltage at selected points in the...circuit of a superheterodyne receiver." An examination of this statement reveals that the student is pictured <u>doing</u> something, with particular end-products desired, and in relation to a specific kind of circuit. However, the statement still leaves unanswered some questions concerning the behavior to be displayed. Is the student to perform these calculations with or without references containing formulas such as Ohm's law? Is Ohm's law the specific basis for the calculations or is some other calculation principle involved? Will the calculations be made with test equipment on an actual circuit, or will it merely be a paper exercise? If a circuit is involved, will the condition of the circuit be static or dynamic? These types of questions indicate that the behavioral objective used as an example must be amplified to include the specific conditions under which the behavior is to be displayed. The following statement serves this purpose more effectively. "<u>Given a handout outlining Ohm's law and resistor color codes; a voltmeter and ammeter; and 10 pre-adjusted receivers configured to represent variable circuit conditions</u>, the student must be able to calculate resistance, current, and voltage at selected points in a superheterodyne circuit."

(b) Example 2. "The student must be able to list in writing the ten basic component parts of the Radio Receiver R-390/URR." Must the student provide this information from memory, or will he be able to use notes, a chart, or a technical bulletin? The statement is not clear because the conditions have not been specified. Consider these improved statements: "From memory, the student must be able to list in writing the five technical characteristics of the Radio Receiver R-390/URR." Or, "When shown a Radio Receiver R-390/URR, the student will be able to identify orally by name each of its 26 operational controls without the aid of notes or references." Or, "Given a properly functioning Radio Receiver R-390/URR, and a set of operating instructions, the student must be able to tune to any specified frequency within the receiver's range."

c. State the Criterion of Acceptable Performance.

(1) Explanation. When the required behavior and conditions of performance have been described, the ability of the objective to communicate can be increased by stating how well the learner must be able to perform. This is done by defining the criterion or standard of acceptable performance. The criterion consists of words which describe minimum acceptable performance, set a time limit where appropriate, or define quality and/or quantity standards for the work product or service produced. To insure that the criterion is clearly established, the following type of terminology is suggested:

Within 2 minutes....
Without error....
100% correct....
At least eight out of ten....
Each of the five principles....
All of the following....
To a tolerance of....
The exact techniques of....
Accurate to the nearest tenth....
Within plus or minus 2 degrees....
Within 1600 meters....
To conform to a template....
In accordance with procedures defined in....
To the standards defined in....
Accurate to two significant figures....

(2) Examples. Study these examples of objective statements, one without a properly stated criterion and the other having a clear standard of acceptable performance.

(a) Example 1. "From memory, the student must be able to list and define in writing the technical characteristics of the Radio Receiver R-390/URR." What is acceptable performance here? How many technical characteristics are there? How many must the student list and define? How is the adequacy or accuracy of the definitions checked? The objective does not provide answers to those questions. Consider this improved statement. "From memory, the student must be able to list in writing four of the five technical characteristics of

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the Radio Receiver R-390/URR and define these characteristics <u>as set forth</u> in pages 5 and 6 of TM...." Or, "When shown a Radio Receiver R-390/URR, from memory the student must be able to identify orally by name, <u>each of the 26</u> operational controls <u>within 5 minutes and with complete accuracy</u>. <u>Nomenclature used must conform with standard terms contained in the operating manual</u>." Note that the student must be able to identify all 26 controls, <u>within 5 minutes</u>, and with <u>complete accuracy</u>. There is no interpretation needed to identify the exact standard required.

      (b) <u>Example 2</u>. "The student must have a working knowledge of resistor color coding." What must the student "know" about resistor color coding? How can acceptable performance be determined? This objective leaves many unanswered questions. Consider this revised statement: "Given a schematic diagram of a 5-resistor series parallel circuit with the values of the resistors marked, an assortment of 15 resistors including five with values corresponding to those on the diagram, a circuit board, and wiring, the student must be able to select the correct resistors and construct a circuit <u>electrically equivalent to the diagramed circuit within a time limit of 10 minutes</u>." In this example the criterion is clearly specified.

      (c) <u>Example 3</u>. "The student must be able to use an ammeter and voltmeter to determine capacitive reactance and capacitance." Here, the behavior is clear, but the conditions and criterion are not specified. An improved statement follows. "Given a working two-component series RC circuit connected to a variable frequency source, an ammeter, a voltmeter, slide rule, pencil, and paper, the student must be able to determine the capacitive reactance and capacitance <u>to two significant figures and within 5 percent of preestablished values within 5 minutes</u>. The values of the resistor and capacitor in the circuit will be illegible, but the settings of the power source will be visible." Note that in this example both a "quality" and a "time" criterion are specified.

    2. <u>Format</u>. Although it is possible to write a single statement which incorporates the three essential parts of a true performance objective, it is far easier to write clear objectives by physically separating the three parts. Therefore, regardless of whether the performance objective is written for an MOS, a duty, a task, or an element, a format similar to Annex A should be used for writing performance objectives for all courses of instruction.

    3. <u>Checking Performance Objectives</u>. Draft performance objectives must be subjected to a final, rigid check prior to their publication and distribution. The items listed below are some of the most important standards to apply in checking the adequacy of performance objectives.

      a. <u>General</u>.

      (1) Are the statements free from grammatical, spelling, and typographical errors?

      (2) Is the sentence structure clear, concise, simple, and straightforward?

(3) Is the use of punctuation, abbreviations, and hyphen-
ation correct and uniform?

(4) Do the statements avoid ambiguity?

(5) Is extraneous or confusing information excluded?

b. Behavior.

(1) Does the statement clearly and precisely describe
what the student will be doing when he demonstrates what he has learned?

(2) Does the statement avoid the use of "loaded" words?

(3) Does the statement begin with a verb?

(4) Does the statement describe a complete action?

c. Conditions.

(1) Does the statement clearly and completely describe the
conditions under which the student must demonstrate the required behavior?

(2) Does the statement begin with the word "Given"?

(3) Does the statement identify what the student will be
given to do the job (tools, equipment, job aids, materials)?

(4) Does the statement clearly identify the tools, equip-
ment, job aids, or materials the student will be denied (when this is
pertinent)?

(5) Does the statement describe the physical environment
(space, climatic conditions, lighting conditions) in which the job must
be done (when these are significant)?

(6) Does the statement describe the assistance (if any)
the student will receive?

(7) Does the statement describe the amount and kind of
supervision (if any) the student will receive during job performance?

d. Criterion.

(1) Does the statement clearly describe how well the stu-
dent must perform?

(2) Is the minimum level for acceptable performance
clearly defined?

(3) Is the quality of the work products or services
defined in terms of standards of accuracy, completeness, format,
sequence, clarity, neatness, tolerances, or number of errors permitted?

(4) Is the quantity of work products or services defined
in terms of the number of units completed per unit of time or the total
number of units required?

(5) Are time standards clearly defined in terms of dura-
tion of the performance, speed of performance, or total time allowed
for performance.

C. PROCEDURES

1. Drafting Performance Objectives.

a. Performance objectives will be drafted by evaluators on
IATEV Form 1 (see Annex A) using as a basis the final priority list

of training requirements.

        (1) A separate Performance Objective Workcard will be prepared for each job duty, task, and element.

        (2) On each card, the title of the major duty, the title of the task, and the element number (i.e., "1 of 3 elements") will be entered in the spaces provided.

        (3) Using the steps defined in section B of this chapter, separate entries will be made to describe the behavior, conditions of performance, and criterion for each job, duty, task, and element.

     b. Additional entries will be made on the card as follows:

        (1) "Major references" will include the primary official source document relating to the duty, task, or element.

        (2) "Student reference" consists of an entry of the primary reference document to be used by the student.

    2. Checking Draft Performance Objectives.

     a. The drafter of a Performance Objective Card will check completed cards against the list of standards defined in paragraph B3 above.

     b. Following this check, the cards will be submitted to two other evaluators for review, again using the standards defined in paragraph B3 above.

    3. Final Review, Publication, and Distribution.

     a. A complete set of Performance Objective Workcards will be routed to the Chief, Evaluation Unit for staffing and final review.

     b. Following these reviews, Performance Objective Workcards will be prepared in final form and reproduced in sufficient copies to meet requirements.

D. REFERENCES

1. Mager, Robert F., Preparing Objectives for Programed Instruction, San Francisco, Fearon Publishers, Inc., 1962.

2. Guide to the Preparation of Performance Objectives (Supplement to USAAVNS Pamphlet No. 310-1, US Army Aviation School, Fort Rucker, Alabama, January 1964.)

3. Job Analysis Schedule, Form AGTZ 8, Office of Personnel Operations, Department of the Army, March 1960.

CHAPTER 5

CONSTRUCTING CRITERION MEASURES

A. INTRODUCTION

1. **Definition.** Criterion measures are tests designed to assist members of the staff and faculty to arrive at reliable judgments concerning the adequacy of student performance on job-relevant behaviors, under either authentic or simulated conditions, and with predetermined "go/no-go" standards of acceptability.

2. **Sources of Criterion Measures.** At this point a brief review of the logic underlying the approach to the improvement of training programs may help to set the stage for the development of criterion measures. Using classical job analysis procedures, Agency jobs, including their component duties, tasks, and elements, have been analyzed. Training objectives have been derived directly from these job data and stated in terms of job duties, tasks, and element performance objectives. These objectives define the behaviors which the criterion must measure, specify the conditions of performance, and identify the degree of proficiency which a School-trained man must demonstrate for each behavior. The criterion measure is derived <u>directly from the objectives</u> and not from lesson plans or other curriculum documents

3. **Standards.** Because the training objectives are based on a detailed analysis of the job for which the students are being trained, the "nice-to-know" has been cut away. All objectives, then, are essential, and the criterion measure should consist of a test which measures thoroughly each and every objective within the boundaries and terms stated in the objectives themselves. To show that he has attained the objectives, the student must meet or exceed the level of performance required for each essential training objective. Because they are <u>all</u> essential, unsatisfactory performance on one part of the test cannot be compensated by superior performance on other parts. Under these conditions, relative grades or standings become meaningless. Therefore, standards for criterion measures must be set in terms of absolute grades, scores, or levels of performance that are acceptable as "minimum passing" or "minimum qualifying."

B. PURPOSES OF CRITERION MEASURES

1. **System Validation.** There are many uses to which a test or measure can be put. However, during the period when the training system is being validated, i.e., during the conduct of pilot courses, criterion

measures are used to evaluate the instructional system that has been applied. That is, to conduct pilot courses, appropriate content and strategies have been selected, students have been trained with the instructional materials, and tests have been administered. The test scores are now examined to see if the instructional program was successful. Ideally, every student who completes the course of instruction will achieve a perfect test score because the criterion measure includes only those behaviors which have been determined to be relevant to the job. Practically, however, a class average score of 90 percent, with a range from 80 to 100 percent, might be considered evidence that the objectives of the instruction have been achieved. Actually, if 90 percent of the class achieve a score of 90 percent or higher, the students "learned" (met the criterion) and the instructional system is proved to be a good one. (This statement is true for a 90/90 level of achievement for several pilot classes.) If the students did not "learn" (fell short of the criterion), the system is a poor one. In sum, the philosophy of criterion testing is completely different from conventional testing. Although a criterion test or measure can and does test the student, its primary purposes during the validation phase are to test the adequacy of the instructional system, to identify weak elements and their causes, and to provide data upon which to base modifications of the system.

   2. Conventional Purposes. Once an instructional system has been evaluated and has demonstrated its teaching adequacy, the criterion measure can be used for several other purposes.

       a. To Evaluate, Graduate, or Eliminate. Necessary cut-off scores, based upon experience with relatively large numbers of trainees, are established to evaluate trainees and to graduate or eliminate them from the training program.

       b. To Diagnose Learning Difficulties. This application involves careful review of the responses of individual students to test items. The goal of this review is to identify specific requirements for remedial instruction.

       c. To Maintain Quality Control. Here the objective is to evaluate both the students and the instructional program. By systematically testing students who have completed a training program, criterion test scores will quickly identify groups among which proficiency is low. This circumstance raises questions about the aptitudes and motivation of that group. It also makes the instructional program suspect. An examination of both student input and the test results is thus indicated to determine which part of the program has been ineffective.

       d. To Pretest a Group of Students. This is accomplished prior to their entry into a course of instruction where appropriate. Pretests furnish information on the repertoires of beginning students as compared with students who have completed instruction. This information can be used:

           (1) To provide curriculum builders and instructors with an inventory of the abilities of the average entry student population.

(2) To measure the degree of learning and the amount of behavioral change when pretest scores are compared with post-test or criterion test scores.

(3) As an assignment device, to place students at different stages of the instructional program (remedial for low scores and bypass for students possessing prior knowledge and skills in the areas under consideration).

(4) As a prerequisite test for enrollment in an advanced course of instruction.

C. TYPES OF TESTS AND THEIR ADVANTAGES AND LIMITATIONS

1. Paper and Pencil Objective Tests.

a. Description. These measures are printed or duplicated. The trainee either marks his answers on the test, a separate answer sheet, or an IBM card. Questions may all be written, or there may be printed numbers, diagrams, pictures, or other material to accompany test items.

b. Advantages.

(1) Scoring is objective.

(2) Scoring is quick and easy.

(3) The tests can be administered to large groups simultaneously.

(4) The tests can be designed to be self-administering.

c. Limitations.

(1) Paper and pencil tests cannot validly measure all types of behavior.

(2) They are difficult to construct.

2. Oral Objective Tests.

a. Description. These tests are similar to written tests in their content and method of administration except that the examinee talks instead of writes.

b. Advantages.

(1) They are easy to prepare.

(2) They are easy to administer.

c. Limitations.

(1) They must be administered to one trainee at a time.

(2) They are difficult to score unless they are the short-answer type.

3. Ratings.

a. Description. Ratings may be adjectival or numerical, based on judgments made with or without a scale which describes behavior at several levels.

b. Advantages.

(1) Ratings are easy to collect.

(2) They are frequently easier to score than other measures.

(3) The average is likely to be reliable if five or more raters evaluate the behavior and the ratings are averaged.

    c. Limitations.

(1) Individual ratings are highly unreliable.

(2) Rating procedures are time-consuming and, therefore, expensive.

4. Performance Tests.

    a. Description. Performance tests require the examinee to do something. Usually what is required is a sample of the work associated with a particular duty or task. Scores may be based on time to complete, accuracy of the work done, quantity of work done, or quality of the work product. Usually, a performance test requires the trainee to use tools or equipment which he will use on the job. Occasionally, a performance test uses simulated tools, equipment, or materials. In rare instances special equipment may be prepared for performance tests.

    b. Advantages.

(1) They have face validity; i.e., they appear to "cover the whole duty or task" and they appear to measure perfectly.

(2) They are job oriented.

    c. Limitations.

(1) They usually cover only a part of a job.

(2) They require more time to administer per item than other types of tests.

(3) They are usually administered individually.

(4) They often require tools, equipment, and materials which add to the problem and expense of administration.

(5) They are difficult to design.

D. TYPES OF CRITERION MEASURES

1. MOS Qualification Tests. For each MOS-producing course, a qualification test will be constructed. This test will be administered to students at the completion of the course. The test will be a comprehensive measure of the student's ability to perform the full range of job duties and tasks for which the School has provided training. The test will replicate, as realistically as possible, the conditions under which the student will be expected to perform his duties when assigned to ASA operating units. The standard of performance for these duties and tasks will be that required for acceptable beginning job proficiency. The source of the job data for the identification of job skills, conditions of performance, and criteria of performance is the Job Performance Workcards (IATEV Form 1) provided by the Evaluation Unit. Successful performance on this test will be required for graduation.

2. _Internal Criterion Tests_. At carefully selected points during
the conduct of an MOS-producing course of instruction, internal cri-
terion tests will be administered. Usually, these tests will cover a
single major task of an MOS; however, these tests may also cover clus-
ters of related tasks. Occasionally, job elements may be of sufficient
importance and complexity to warrant the development and administration
of separate tests. The primary source of data for the construction of
internal criterion measures is the Job Performance Workcard (IATEV Form 1).
However, these materials may be supplemented by references to course con-
tent found in content outlines or in the POI when academic prerequisites
are of sufficient importance to justify separate testing. Performance
standards for internal tests will be consistent with criteria specified
in the Performance Objective Workcards. If an internal test has been
constructed to measure job knowledge, rather than job skill, absolute
standards, at or near mastery of the material (e.g., 90 percent) will
be established. These tests will be used to establish readiness to
progress to the next unit of instruction and to identify academic defi-
ciencies for remedial instruction, recycling, or elimination from the
training program.

E. DESIGN OF CRITERION MEASURES

1. _Forms of the Test_. In designing a criterion test for a mili-
tary training situation, conditions actually found on the job should be
duplicated or simulated. These measures ideally require performance of
a job or a portion of it. It should be evident that the performance test,
as described in paragraph C4 above, is the most desirable type of cri-
terion measure. However, some criterion measures may take the form of
written or oral objective tests consisting of problems calling for the
application of technical knowledge.

2. _General Characteristics_. An acceptable criterion must be
valid, reliable, objective, administrable, standard, and economical.
Definitions of each of these characteristics follow.
   a. _Valid_. A test is valid when it tests what it purports to
test and not something else. For example, if a test is supposed to test
ability to tune a radio receiver, but actually tests reading ability,
it is invalid. Validity has implications for both the form of the test
(oral, written, performance) and for its coverage. The form must be
appropriate to the required performance and the test items must cover
each individual objective.
   b. _Reliable_. A test is reliable when it measures consist-
ently; that is, the test is stable. For example, if the same test is
administered on two occasions to the same group of students, who have
had no additional training on the test subjects, the relative standings
of the group should not change appreciably. If they do, the test is
unreliable. Administration procedures, scoring, and length of the test
are factors in reliability.

c. **Objective**. A test is objective when the judgment or bias of the scorer is eliminated from the scoring. That is, if ten scorers graded the same test and they all arrived at the same score, the test would be objective.

d. **Administrable**. Administrability is insured by preparing written directions for the administration of the test and requiring that either the examiner read them verbatim to the trainees or the testees read them.

e. **Standard**. A test is standard when a systematic sample of performance has been obtained under prescribed conditions and scored according to definite rules. In addition, the items of a standardized test have been experimentally evaluated and evidence of validity and reliability has been collected.

f. **Economical**. A test is economical to use when a minimum of time, equipment, and materials is required to administer and score it.

F. PROCEDURES

1. **MOS Qualification Tests**.
   a. **Test Planning**.
      (1) Upon receipt of a complete set of Performance Objective Workcards (IATEU Form 1) from Chief, Evaluation Unit, Chief, E&MT Division will assign a test writer to develop a test plan in the format prescribed at annex A. The test plan will:
         (a) Define the purposes of the test.
         (b) Identify the specific job tasks to be evaluated. In making this decision, the test writer will consider:
            1. The importance of the tasks to the total job.
            2. Practical limitations of equipment, space, time, and personnel.
         (c) Determine the "type" measure to be used in evaluating each task performance. Selection of "type" measures will be based on the following considerations:
            1. The probable validity and reliability of the "type" measures to be applied.
            2. Practical limitations of equipment, space, time, and personnel.
         (d) Set the standard of performance for each task.
            1. For paper-and-pencil or oral objective tests, the criterion will be stated as a percentage of items correct; e.g., 90 per cent.
            2. For ratings, the criterion will be stated as an absolute score, e.g., 30 out of a possible 32 points.
            3. For performance tests, the criterion will be a restatement of the criterion entered on the Performance Objective Workcard.

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(e) Enter additional information pertaining to the evaluation strategy in the "Remarks" column of the test plan.

(2) The completed test plan will be coordinated by Chief, E&MT Division with the academic department and the action officer, Evaluation Unit.

    b. <u>Test Construction</u>.

(1) When the test plan has been coordinated with responsible individuals as indicated in paragraph 1a(2), test writers will draft the test items/situations using the following guides:

(a) Select realistic and practical problems. Test items should require demonstration of the knowledge or skills which are to be taught to the student, or present a problem of the type he will have to solve on the job.

(b) Select important aspects of the job. Items/situations selected for a criterion measure should not deal with unimportant details of a job.

(c) Select items/situations which demand specific job knowledge or skills. Avoid questions or problems which can be answered or solved merely by intelligent reasoning or the application of general knowledge.

(d) Use job language. Items/situations should be phrased in the working language of the job; however, the use of unnecessary technical terms should be avoided.

(e) Make each item/situation independent of other items. Test items or situations should be selected so that the solution of one item does not give away the answer to another. Nor should the test be so constructed that failure to solve an item makes it impossible to continue the test.

(f) Fit the difficulty of the item/situation to the required level of job knowledge or performance. The purpose of the test is not to trick the student or mislead him. Wide variability of scores is not desired in a criterion measure.

(2) When a draft test has been prepared by E&MT Division, it will be carefully reviewed to insure that:

(a) The test adequately samples the job knowledge and skills of the MOS.

(b) Each item/situation matches the specifications of the test.

(c) The items are well constructed.

(3) The E&MT Division test writer will then prepare directions for test administration. All directions must be specific, complete, concise, clear, and standardized.

(a) Directions to the student will include what he is to do, how he is to go about doing it, the conditions under which he will perform, and how he will be graded.

(b) Directions to the examiner will include the conditions under which the test is to be administered, the exact procedures to be used, a list of the required equipment and materials, grading or rating procedures, and a schedule or system of rotation if different tasks are to be evaluated at two or more work stations.

(4) The draft test and directions for administration will then be submitted to the individual in the responsible academic department designated by the department director to review the test for technical accuracy.

(5) Following review and correction of errors, Chief, E&MT will assemble the complete MOS qualification test in final form for publication and forward the package to Director, Office of Training Literature for editing.

(6) Chief, E&MT Division will make necessary corrections and forward through Director, Office of Training Literature to Publications Branch for printing.

(7) Printed copies of tests will be stored by Chief, E&MT Division.

    c. <u>Test Try-out and Revision</u>.

(1) Chief, E&MT Division will select a <u>representative</u> class of students and administer the criterion test under controlled conditions.

(2) Following scoring and statistical analysis, the results of the trial test will be forwarded by Chief, E&MT Division to Chief, Evaluation Unit for review.

(3) The test will be revised in accordance with the recommendations of Chief, Evaluation Unit and republished using the procedures defined paragraph b(5) through (7) above.

    d. <u>Test Administration and Processing</u>.

(1) Chief, E&MT Division will administer criterion tests to each MOS class (pilot courses only), score the tests, and perform statistical analysis.

(2) "Minimum qualifying" scores for the test will be established by Director of Instruction on recommendation of Chief, E&MT Division.

(3) Chief, E&MT Division will prepare class rosters showing each student's score on the test and designating each student as being Q (qualified) or U (unqualified). These rosters will be distributed as follows:

        (a) Chief, Academic Affairs - original and one copy.

        (b) Director of Instruction - one copy.

        (c) Director, Academic Department concerned - one copy.

        (d) Chief, Academic Division concerned - one copy.

        (e) Chief, E&MT - one copy (for file).

2. <u>Internal Criterion Tests</u>.

    a. <u>Test Planning</u>.

(1) Upon completion of the content outline and the sequence of job tasks, the Director, Academic Department concerned will forward a copy of the outline and the sequence to Chief, E&MT Division for the development of test plans.

(2) Chief, E&MT Division will assign a test writer to develop a series of test plans for the course.

(3) The test writer will determine the number of Internal Criterion Tests required. This decision will be based on the following:

(a) Each internal test will cover a logical grouping of job tasks or elements as defined in the Performance Objective Workcards (IATEV Form 1).

(b) The content outlines which support the task level Performance Objective Workcards will be reviewed to insure adequate sampling of job knowledge and skills taught in the block of instruction covered by the test.

(c) The sequence of tasks provided by the responsible academic department will be followed to determine appropriate points for the administration of tests.

(d) Tasks critical to the development of acceptable job performance and to further progress in the course will be selected for testing.

(4) A test plan for each Internal Criterion Test will be prepared in the format prescribed in annex A using the procedures defined in paragraph 1a(1) of this section.

(5) The completed test plans will be routed through Chief, E&MT Division, Director Academic Department concerned, Director of Instruction, Chief, Evaluation Unit, and the Technical Consultant for review and approval.

b. Test Construction. When the test plans have been approved, E&MT Division test writers will construct draft tests using the guides defined in paragraph 1b of this section.

c. Test Try-out and Revision. See paragraph 1c of this section.

d. Test Administration and Processing.

(1) Chief, E&MT Division will provide for the administering of criterion tests to each MOS class, the scoring of the tests, and the performance of statistical analyses.

(2) "Minimum passing" scores for each test will be established by Director of Instruction on recommendation of Chief, E&MT Division.

(3) Chief, E&MT Division will prepare class rosters following each test administration. These rosters will show each student's score and the designation P (pass) or F (fail). Rosters will be distributed as follows:

(a) Chief, Academic Affairs - original and one copy.

(b) Director of Instruction - one copy.

(c) Director, Academic Department concerned - one copy.

(d) Chief, Academic Division concerned - one copy.

(e) Chief, E&MT - one copy (for file).

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G. REFERENCES

1. A Handbook for Programmers of Automated Instruction, Textruct II, US Army Air Defense Human Research Unit, Fort Bliss, Texas, September 1963, chapters IV and IX.

2. Item Writer's Guide, USASATC&S Special Publication 1502, December 1961.

3. Manual for Administration of School Achievement Tests, USASATC&S Special Publication, undated.

ANNEX A

CRITERION TEST PLAN

TEST TITLE _____

TEST PLANNER _____

TYPE OF TEST: ☐ MOS Qualification ☐ Internal Criterion

TEST NO. ___ of ___ Tests

DEPT _____ DIV _____

Obj No.	Type Measure			Testing Materials and Conditions	Testee's Product	Criterion for Passing or Qualification	Method of Scoring
	Paper and Pencil	Oral	Rating	Per-form-ance				

Approved:

Ch, E&ET Div	Date ___	Dir, Instr ___ Date ___
Ch, Eval Unit	Date ___	Tech Com ___ Date ___
Dir, Dept ___	Date ___	

CHAPTER 6

SELECTING AND SEQUENCING COURSE CONTENT

A. INTRODUCTION

1. **Review of Steps.** The sequence of steps in the development of an instructional system up to this point provides the broad framework for a course. In the initial step, the total job was analyzed, with all of its variations, as it is performed in the field. A decision was made as to exactly which duties and tasks should be the objectives of School training and which requirements should be handled by on-the-job training. In subsequent steps, what the learner must demonstrate that he is able to do as a result of training, the conditions under which he must be able to perform, and the standard or criterion of performance required were defined. The emphasis up to this point has been on how the learner will perform following specific learning activities. Any reference to content or learning activities has been deliberately avoided and the focus has been kept on the required performance.

2. **The Relationship Between Content Selecting and Sequencing.** Now that the required performances have been clearly defined, the knowledges, skills, and values which support each performance objective and the sequence of their development can be identified. Essentially, the job is twofold: first to examine each performance objective and identify the specific concepts, principles, facts, and operations involved in each task; and second, to arrange these teaching points in the best order for learning. Although the processes of selecting and sequencing content are closely related and interwoven, for purposes of clarity each process will be discussed separately.

B. CONTENT SELECTION

1. **Sources of Content.** Official publications of Department of Defense, Department of the Army, NSA, and HQ USASA are the primary sources of the concepts, principles, facts, skills, and values which make up the course content. Such documents as TM's, FM's, NSA and ASA manuals, directives, and instructions are included in this category. Secondary sources of course content include locally developed documents, such as school position papers and lesson plans. Secondary references may be used as sources only in the absence of official publications dealing with the content required to support a performance objective.

2. **Criteria for Content Selection.** There are two categories of criteria which must be applied in selecting course content. The first category relates to the source documents used as a basis for content selection. The second deals with the relationship of content to the achievement of the required standard of performance.

a. **Documentary Criteria.** The following items are important from the standpoint of selection of source documents:

(1) If official, the document must be the most recent edition.

(2) If locally produced, the document must represent an approved "school position."

b. **Job Criteria.** The following items are critical during the selection of specific course content:

(1) The content is directly related to an element of job performance as proven by job analysis and defined on Performance Objective Workcards (IATEV Form 1).

(2) The content is _critical_ to the development of the required job performance. That is, the man could not perform the job satisfactorily without the knowledge or skill.

3. **The Process of Content Selection.** The act of "breaking out" the concepts, principles, facts, and skills which support a performance objective is comparable to the process of outlining the "points-to-be-taught" in a conventional lesson plan. The essential difference is that the content selector has a list of specific statements of required performance rather than vague guides such as to provide a "working knowledge" of some subject. The fact that he has a set of performance objectives permits the content selector to focus on learning outcomes and identify the "meat" of the lesson more precisely. This does not mean that the presence of performance objectives makes content selection a mechanical process, but it does simplify the job and removes most of the guesswork.

C. COURSE SEQUENCING

1. **Definition.** Learning is a "building block" process which results in a change of behavior. Changes in what a person is able to do are developed gradually and in stages. Sequencing is the process by which learning experiences are placed in the configuration which will produce the most learning in the shortest period of time. It avoids both unnecessary duplication and gaps in content. Adequate sequencing insures that component knowledges and skills have been developed before the complete behavior is to be demonstrated. Proper sequencing guarantees that the development of a skill is orderly, and that prerequisite learnings have been acquired prior to the introduction of advanced content or skills.

2. **Types of Sequencing.** The sequence of lessons in a course of instruction can be based on one or more of the following conditions:

a. **Job Performance Order.** This is a sequence based on the order in which a job, duty, task, or element is actually performed.

b. **Logical Order.** This is a sequence dictated by the inherent logic of the subject-matter; e.g., mathematics.

c. **Psychological Order.** This is an ordering of content based on ease of learning. In general, it means that older learnings serve as the basis for new learnings, that when possible, the learner moves from the simple to the complex, from the familiar to the unknown, from the concrete to the abstract. In actual practice, all types of sequencing have their place in course development. All types will be used. However, sequencing decisions must be based on the actual content involved in the development of specific job task or element performances. Both content selection and sequencing must be completed before lesson plans and teaching aids are developed.

3. **Sequencing Guides.** The following guides should be used in determining the sequence of tasks and the sequencing of elements within a task.

a. Place easily learned tasks early in the course.

b. Introduce early in the sequence broad concepts and technical terms which have application throughout the course.

c. Place application of concepts close to the point of initial development.

d. Place requisite skills and knowledges in the sequence prior to the points where they must be combined with subsequent ones and applied.

e. Provide for maintenance and review of skills and knowledges which are essential parts of later tasks and duties.

f. Introduce a concept or skill in the task in which it is most likely or most frequently to be used.

g. Don't "overload" any task with difficult-to-learn elements.

h. Provide for redevelopment and practice of required skills and concepts in areas where transfer of identical or related skills is not likely to occur.

i. Place complex or cumulative skills late in the course sequence.

D. PROCEDURES

1. **Preliminary Steps.**

a. When performance objectives have been developed for a course of instruction, Chief, Evaluation Unit will forward the Performance Objective Workcards (IATEV Form 1) through the Director of Instruction to the academic department responsible for selection of course content and sequencing. (See annex A.)

b. The Director of the responsible department will designate a project officer for course development and provide MOS-qualified personnel as assistants.

c. A representative of the Evaluation Unit will brief the project officer and his assistants on requirements and procedures.

2. Initial Content Selection.

a. The project officer and his assistants will examine each performance objective and develop separate topical outlines for each Job Element Objective Card. (See annex B.) These outlines must include all of the major knowledges and skills required to achieve the performance specified. The product of this step is a complete outline of all required learnings for each job element. That is, every specific concept, principle, skill, or value required for demonstration of each objective is listed regardless of the fact that duplicate items may appear under two or more objectives.

b. Objectives and content outlines are then submitted to the Department Director for a check of completeness and accuracy. The purpose of this step is not to review for detail, but rather to insure that major items of content required for performance have been included and that nonessential content has been omitted.

3. Initial Sequencing.

a. Upon approval of the content outlines, the project officer and his assistants will arrange the objectives and content outlines in developmental learning order. This task will be accomplished as follows:

(1) Using the general guides described in section C3, lay out the job task cards with their supporting element cards and content outlines.

(2) Code each item in the content outline to the appropriate performance objective element card. (See annex C.)

(3) Determine whether each item of content should be initially developed within the task where it first appears in the sequence of tasks. If so, annotate the outline and the element card "ID" (Initial Development). If it should be initially developed in another task, annotate both the card and outline under the proper task. Annotate all duplicate element cards and supporting outlines with the inscription "PR" (Prerequisite). These are job elements which are required for performance of the task but which must be developed earlier in the sequence.

(4) When specific elements and their supporting content are obviously interdependent, a compromise must be made. Make the decision as to where in the sequence the element should be placed on the basis of secondary guides such as difficulty of acquiring the skill or knowledge, or on the basis of an equitable distribution of difficult learnings among the several tasks. (See annex D.)

(5) The tasks are now resequenced according to the order imposed by the coding of "prerequisite" and "initial development" elements. (See annex E.)

(5) Elements within each task are resequenced in the same way.

4. Refined Content Outlines.

a. Now that a tentative sequence of job elements has been established, the content selector starts with the first performance objective and proceeds to develop a detailed content outline. Each item in the preliminary outline is analyzed and, using appropriate references, the teaching points are developed in the form of declarative statements.

b. The final step is to examine all of the detailed content outlines and eliminate any unnecessary duplication which may have occurred within the detailed points-to-be-taught.

c. When a teaching point essential to the development of a concept or skill late in the course sequence duplicates a teaching point developed earlier, it should be clearly identified as a review item of content.

5. Final Sequencing.

a. The refined content outlines are now compared with each set of task element cards.

b. Final adjustments forced by the detailed content outlines are made. (See annex E.)
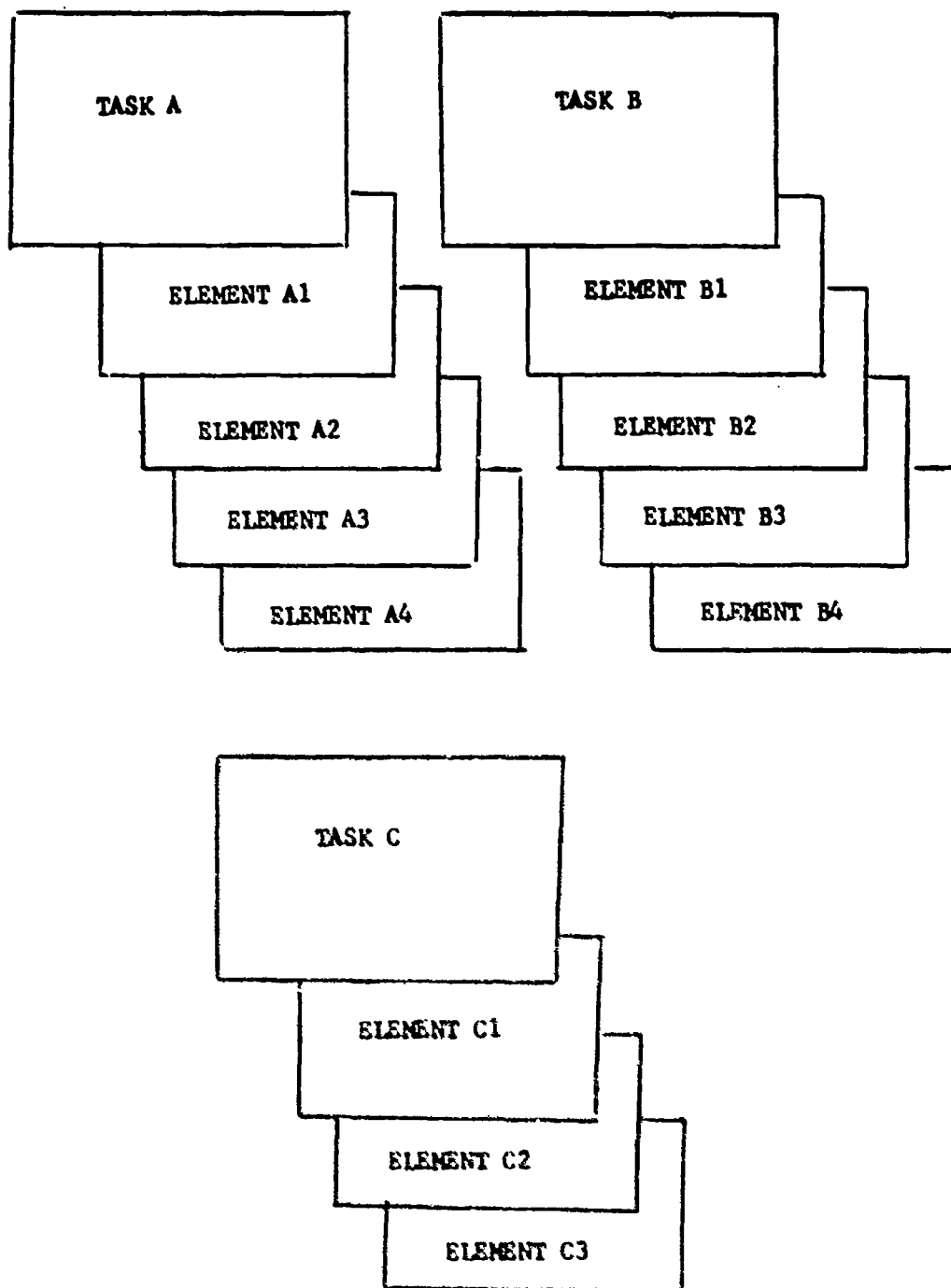
PERFORMANCE OBJECTIVE WORKCARDS

This deck of cards consists of Performance Objectives for the Duties, Tasks, and Elements of the job. Pictured above is a basic set of three tasks with their accompanying elements. We shall follow these cards through the steps of content selection and sequencing.

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┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│              │        │              │        │              │
│   TASK A     │        │   TASK B     │        │   TASK C     │
│              │        │              │        │              │
└──────────────┘        └──────────────┘        └──────────────┘


┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│ ELEMENT A1   │        │ ELEMENT B1   │        │ ELEMENT C1   │
│   ┌──────────┴──┐     │   ┌──────────┴──┐     │   ┌──────────┴──┐
└───│ ELEMENT A2  │     └───│ ELEMENT B2  │     └───│ ELEMENT C2  │
    │   ┌─────────┴──┐      │   ┌─────────┴──┐      │   ┌─────────┴──┐
    └───│ ELEMENT A3 │      └───│ ELEMENT B3 │      └───│ ELEMENT C3 │
        │   ┌────────┴──┐       │   ┌────────┴──┐      └────────────┘
        └───│ ELEMENT A4│       └───│ ELEMENT B4│
            └───────────┘          └───────────┘
```

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┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│   CONTENT    │        │   CONTENT    │        │   CONTENT    │
│   OUTLINE    │        │   OUTLINE    │        │   OUTLINE    │
│              │        │              │        │              │
│  Skill 1     │        │  Skill 1     │        │  Skill 1     │
│  Skill 2     │        │  Skill 2     │        │  Skill 3     │
│  Skill 3     │        │  Skill 3     │        │  Skill 4     │
│              │        │  Skill 4     │        │              │
│              │        │              │        │              │
└──────────────┘        └──────────────┘        └──────────────┘
```
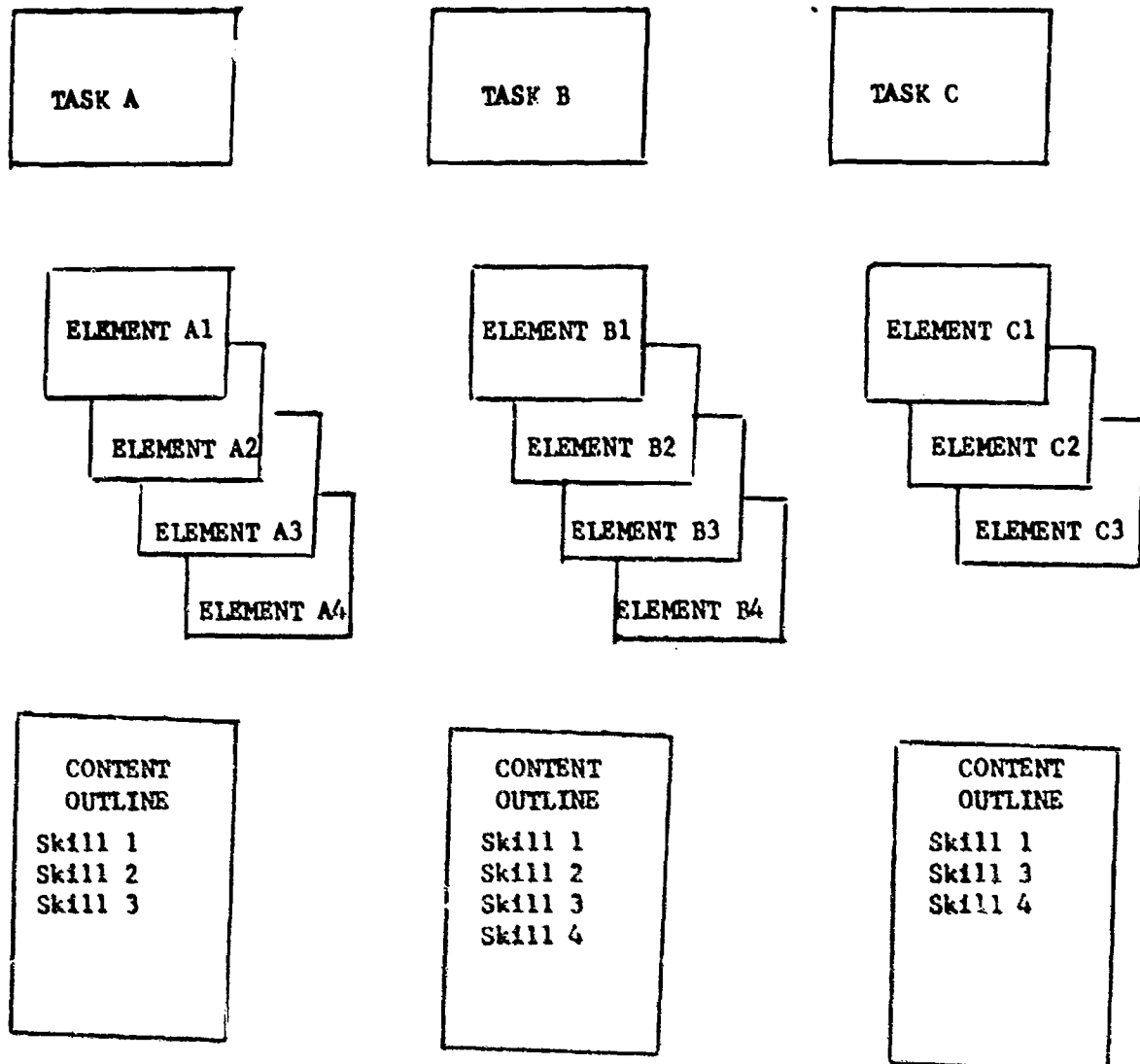
PREPARATION OF CONTENT OUTLINES

The project officer and his team will prepare a content outline for
each task. This outline will list all of the skills and knowledges which
are actually required to perform the elements of each task and, collectively,
to perform the task. In the illustration above, there are duplicate numbers
representing these required skills. This is due to the fact that a basic
set of required skills will often appear under two or more tasks. Identify-
ing these duplications will permit optimum sequencing.

```
┌──────────────┐       ┌──────────────┐       ┌──────────────┐
│              │       │              │       │              │
│   TASK A     │       │   TASK B     │       │   TASK C     │
│              │       │              │       │              │
└──────────────┘       └──────────────┘       └──────────────┘
```

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┌──────────────┐       ┌──────────────┐       ┌──────────────┐
│ELEMENT A1    │       │ELEMENT B1    │       │ELEMENT C1    │
│   ┌──────────┴──┐    │   ┌──────────┴──┐    │   ┌──────────┴──┐
│   │ELEMENT A2   │    │   │ELEMENT B2   │    │   │ELEMENT C2   │
└───│   ┌─────────┴──┐ └───│   ┌─────────┴──┐ └───│   ┌─────────┴──┐
    │   │ELEMENT A3  │     │   │ELEMENT B3  │     │   │ELEMENT C3  │
    └───│   ┌────────┴──┐  └───│   ┌────────┴──┐  └───│            │
        │   │ELEMENT A4 │      │   │ELEMENT B4 │      └────────────┘
        └───│           │      └───│           │
            └───────────┘          └───────────┘
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┌──────────────┐       ┌──────────────┐       ┌──────────────┐
│  CONTENT     │       │  CONTENT     │       │  CONTENT     │
│  OUTLINE     │       │  OUTLINE     │       │  OUTLINE     │
│              │       │              │       │              │
│ Skill 1  ID  │       │ Skill 1      │       │ Skill 1      │
│ Skill 2      │       │ Skill 3      │       │ Skill 3  ID  │
│ Skill 3      │       │ Skill 5  ID  │       │ Skill 4  ID  │
│              │       │ Skill 4      │       │              │
│              │       │              │       │              │
└──────────────┘       └──────────────┘       └──────────────┘
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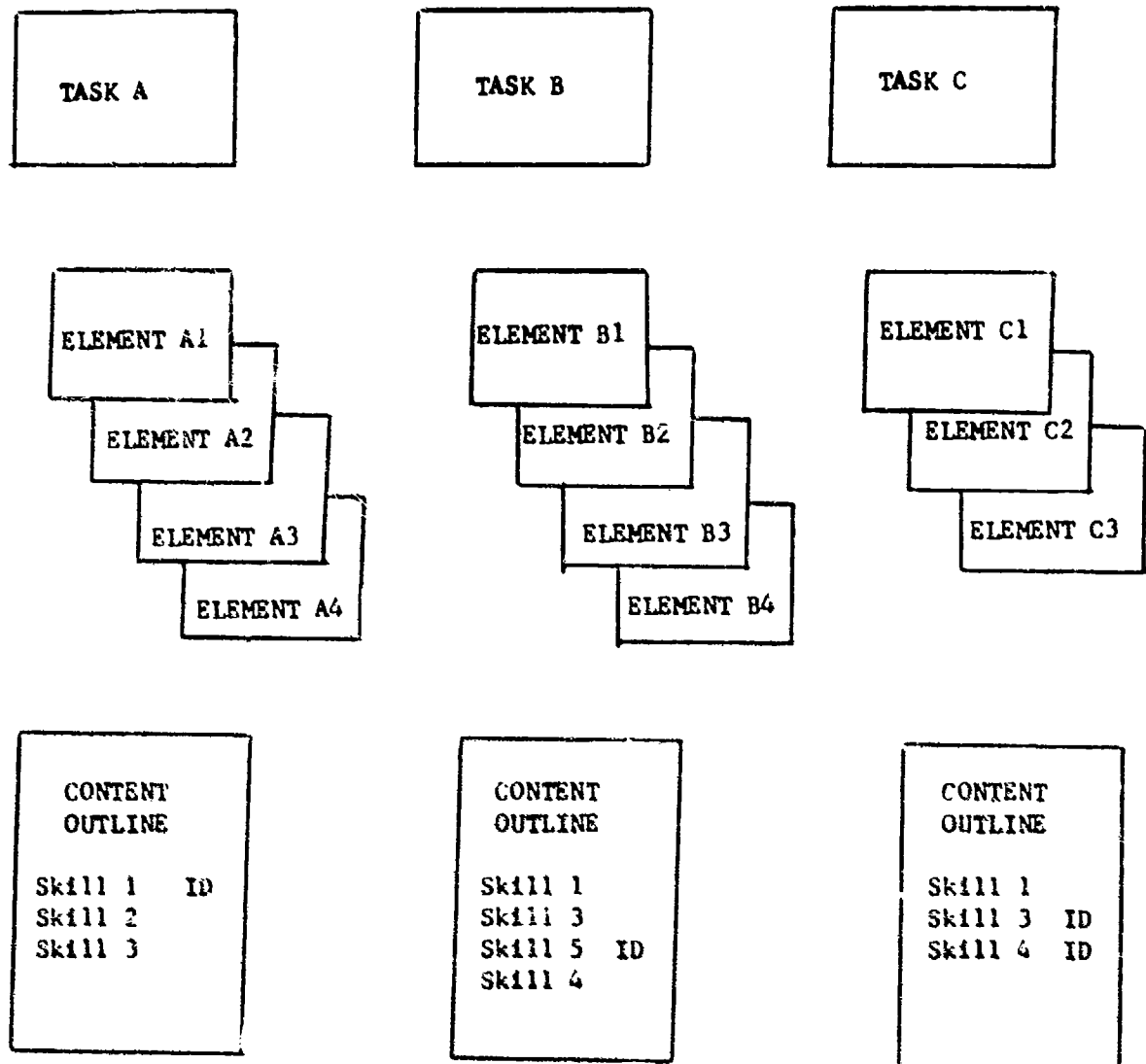
CONTENT CODING

Each required skill and knowledge must be examined to determine
where they will be initially developed (ID). Using the sequencing guides
defined in paragraph C3 of this chapter, code those items in the content
outline which must be initially developed within a task as ID. At this
point, uncoded items are those skills or knowledges which must be developed
before the task is taught.

TASK A

TASK C

TASK B

ELEMENT A1

ELEMENT A2

ELEMENT A3

ELEMENT A4

ELEMENT C1

ELEMENT C2

ELEMENT C3

ELEMENT B1

ELEMENT B2

ELEMENT B3

ELEMENT B4

```
CONTENT
OUTLINE

Skill 1   ID
Skill 2
Skill 3
```

```
CONTENT
OUTLINE

Skill 1
Skill 3   ID
Skill 4   ID
```

```
CONTENT
OUTLINE

Skill 1
Skill 3
Skill 5   ID
Skill 4
```
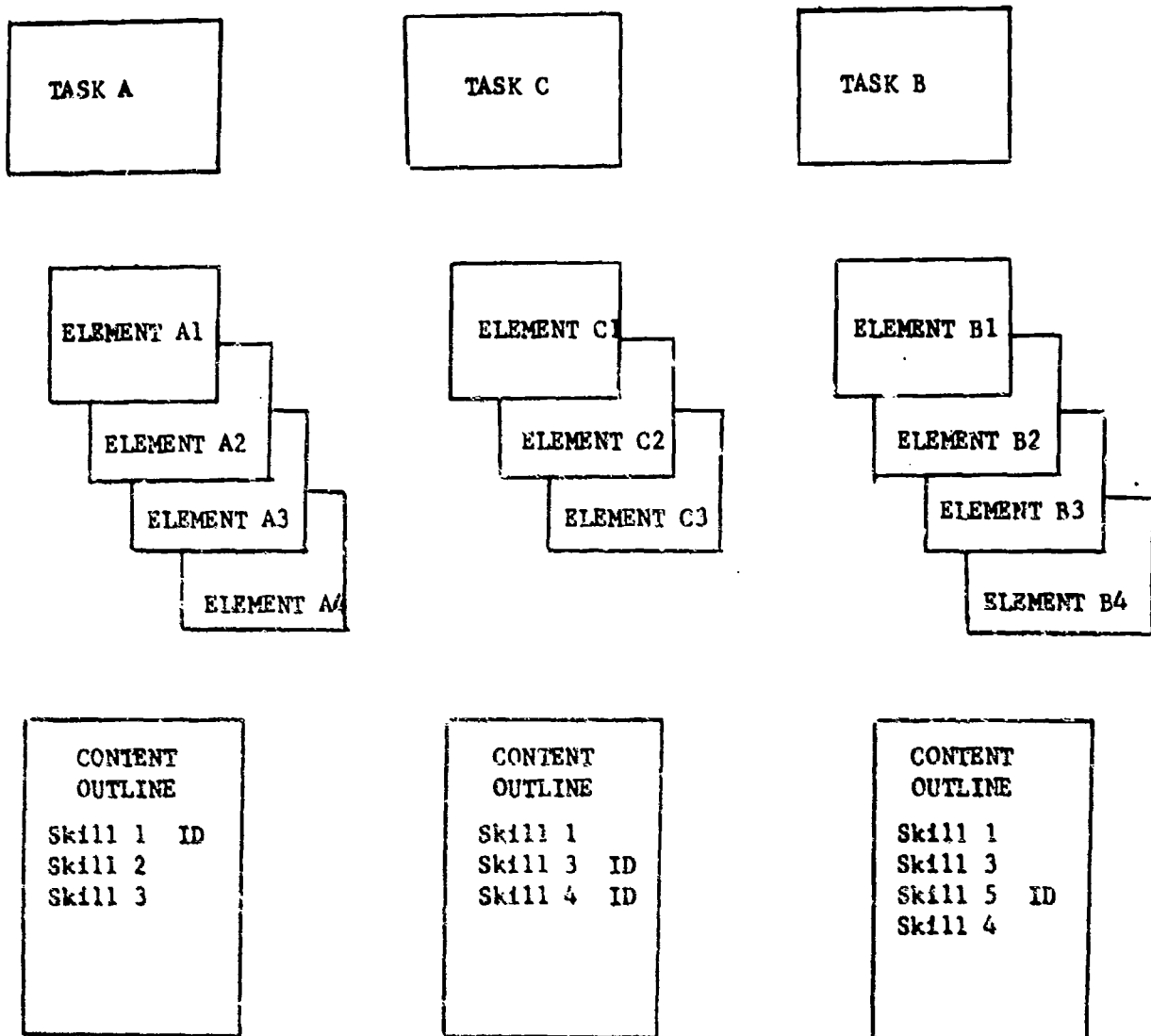
INITIAL SEQUENCING

The tasks are sequenced according to the specifications "forced"
by the initial development coding. Note the problems caused by the
two required skills in the content outline of Task A. These skills
have not been developed as yet and are prerequisites. Adjustments or
compromises must be made to correct this situation.

```
┌─────────────┐         ┌─────────────┐         ┌─────────────┐
│             │         │             │         │             │
│   TASK A    │         │   TASK C    │         │   TASK B    │
│             │         │             │         │             │
└─────────────┘         └─────────────┘         └─────────────┘
```

```
┌─────────────┐         ┌─────────────┐         ┌─────────────┐
│ ELEMENT A1  │         │ ELEMENT C1  │         │ ELEMENT B1  │
│         ┌───┴─────┐   │         ┌───┴─────┐   │         ┌───┴─────┐
│ ELEMENT A2 │      │   │ ELEMENT C2 │      │   │ ELEMENT B2 │      │
│        ┌───┴─────┐│   │        ┌───┴─────┐│   │        ┌───┴─────┐│
│ ELEMENT A3 │     ││   │ ELEMENT C3 │     ││   │ ELEMENT B3 │     ││
│       ┌────┴────┐│    └───────┴─────────┘    │       ┌────┴────┐│
        │ ELEMENT A4 │                                 │ ELEMENT B4 │
        └───────────┘                                  └───────────┘
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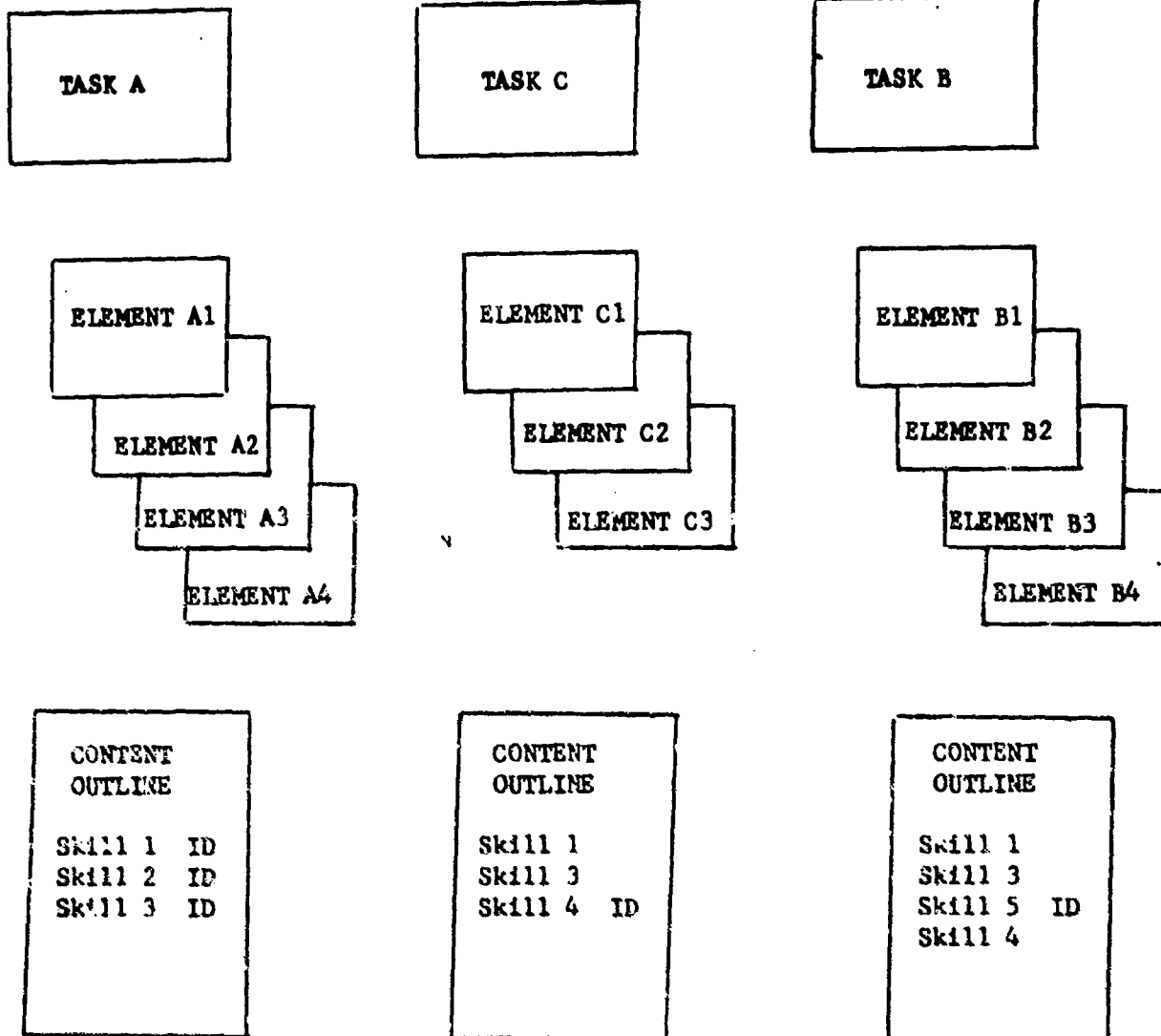
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┌─────────────┐         ┌─────────────┐         ┌─────────────┐
│  CONTENT    │         │  CONTENT    │         │  CONTENT    │
│  OUTLINE    │         │  OUTLINE    │         │  OUTLINE    │
│             │         │             │         │             │
│ Skill 1  ID │         │ Skill 1     │         │ Skill 1     │
│ Skill 2  ID │         │ Skill 3     │         │ Skill 3     │
│ Skill 3  ID │         │ Skill 4  ID │         │ Skill 5  ID │
│             │         │             │         │ Skill 4     │
│             │         │             │         │             │
└─────────────┘         └─────────────┘         └─────────────┘
```

FINAL SEQUENCING

The last step is to make adjustments required by the selection of points for the initial development of a skill. Here we have made the necessary adjustments:

Task A   There is nothing before this task so all skills must be developed initially.

Task C   Required skill 1 is developed in Task A.
          Required skill 3 is developed in Task A.
          Required skill 4 is initially developed.

Task B   Required skill 1 is developed in Task A.
          Required skill 3 is developed in Task A.
          Required skill 5 is initially developed.
          Required skill 4 is developed in Task C.

The identical procedure can be used to sequence the elements within a task.

CHAPTER 7

SELECTING INSTRUCTIONAL STRATEGIES

A. INTRODUCTION

1. __Purpose of the Chapter__. Better understanding of how people learn and the evolution of modern aids to teaching and learning have resulted in the development of a great variety of instructional strategies, methods, systems of organization, and mediating devices. This chapter identifies the more important strategies, indicates the situations in which they should be used, notes their advantages and limitations, and describes procedures to be followed in arriving at strategy decisions.

2. __Importance of Strategies__.
   a. __Proper Selection__. Except for the selection of training objectives, proper selection of strategy will do more to promote efficiency and effectiveness of instruction than any other measure. This fact has largely been overlooked in training and education. All too often the selection of strategy has been dictated by expediency rather than choice. Strategy must be selected through systematic, objective means if inefficiency in attaining objectives, or worse, failure to achieve objectives, is to be avoided.
   b. __Compatibility__. There is no single best method of teaching which applies to all learning situations or instructional objectives. The instructor must choose the strategy which is most compatible with the objectives of the instruction, the nature of the School organization, the facilities and equipment available, the background and level of the students, and his own abilities.
   c. __Variation of Methods__. The accomplished instructor is one who has developed skill in using a great variety of methods and techniques. For each objective to be reached, the instructor can select from among various methods, the specific methods which will best carry his students to the goal. The instructor who is limited in methods often tries to reach an objective by using inappropriate techniques. The result is lack of student interest and attention, inefficient learning, or failure to achieve the instructional goals.
   d. __Repertoire Requirement__. Too many instructors use only one or two methods. Many instructors lecture most of the time. Today, with the great variety of interesting and effective ways of helping students learn, the military instructor should develop a repertoire of approaches. Then, rather than use the same methods for all lessons, he can draw from his repertoire the ones which are most appropriate for a particular situation.

3. Definitions. Although the terms method, technique, approach, and strategy have often been used interchangeably, there are important differences among them. To clarify these terms and to distinguish among them, the following definitions are offered:

a. Instructional Strategy. An instructional strategy is a combination of teaching methods and techniques designed to accomplish an instructional job. It includes mediating devices when used, and a system for organizing instructors and students.

b. Instructional Method. An instructional method is the basic approach to instruction. It may be a lecture, demonstration, conference, performance, programmed instruction, study assignment, tutoring, or a combination of two or more of these basic approaches. Methods may be cataloged under three headings:

(1) Primary. A primary method is an approach which is objectively judged to be the most effective and efficient means of attaining an instructional objective.

(2) Supporting. A supporting method is an approach which is objectively judged to be an essential complement to a primary method; that is, it must be used in conjunction with the primary method to insure the attainment of the instructional goal.

(3) Alternative. An alternative method is an approach which may be used as a substitute for the primary or supporting method when circumstances do not permit the use of the optimum method.

c. Instructional Technique. A technique of instruction is a means of instruction which complements a method; e.g., questioning, handling student responses, and using visual and auditory aids.

d. Systems of Organization. A system of organization is a means of grouping instructors and/or students for instruction; e.g., random grouping, team teaching, and team learning.

e. Mediating Device. A mediating device is a specialized piece of equipment, or system, specifically designed to assist in the presentation of instruction; e.g., teaching machines, classroom student response systems, computer-based instructional systems, and closed-circuit television systems (to include video-tape and kinescope recording and playback facilities).

4. Basic Factors to Consider. Every instructional strategy has certain advantages and limitations. It is essential that careful consideration be given to these advantages and limitations to insure that the strategy selected for a specific instructional job is the one which will be most effective and efficient. Strategy decisions must be based on careful analysis of the training situation from several standpoints: instructional objectives, subject-matter, student population, and instructor, instructional facilities, equipment and materials, time, and costs. In the following paragraphs, each of these factors is discussed.

a. Instructional Objectives. The overriding consideration in the selection of a strategy is the objective of instruction, that is, what the student will be required to do either during a later stage of his training or on the job in the field. If the objectives of a specific block of instruction deal with job knowledges as supporting elements

for the development of terminal behaviors, the strategy selected may be
different from the method chosen to develop job performance skills.
Objectives must also be examined to determine whether the instructional
job is to:

        (1)   Introduce a subject.
        (2)   Provide remedial assistance.
        (3)   Accelerate, enrich, or build academic skills.
        (4)   Teach manual or manipulative skills.
        (5)   Build concepts.
        (6)   Teach operation and functioning of equipment.
        (7)   Develop teamwork.
        (8)   Stimulate interest.
        (9)   Improve reasoning and problem-solving ability.
        (10) Accomplish any one of a host of other objectives which
are appropriate for school training.

      b. Course Content. The nature of the content itself must be
considered in selecting an instructional strategy. The stability of the
content, whether verbal or manipulative, and its difficulty determine to
a great extent the strategy which is most appropriate.

      c. The Student Population. The size of the student group, the
educational level, prior training, aptitudes, maturity, reading and speak-
ing ability, and the teaching location must be considered in selecting a
strategy. For example, optimum conditions for the application of speci-
fic methods demand establishment of maximum and minimum class sizes.
Where class size exceeds or falls short of the established figure, an
alternative method may be necessary.

      d. Instructors. The number, quality, and competencies of
available instructors is an important factor to consider in selecting a
strategy. For example, in a given situation, if technically qualified
instructors are not available in sufficient numbers to handle the student
input, the use of programmed materials may be dictated rather than a more
appropriate demonstration-practical exercise combination.

      e. Facilities, Equipment, and Instructional Materials. Each
instructional strategy requires the use of specific types of facilities,
equipment, and materials. If the required facilities are not available,
an alternative method may be dictated. For example, if it has been
determined that teaching machines would be the most effective media for
the presentation of a block of instruction, but the machines are not
available, an alternative approach will be required.

      f. Time. The time available for a particular block of instruc-
tion also governs the strategy selected. The conference and performance
methods demand larger allotments of time than do the lecture and demonstra-
tion methods. If time is extremely limited, an alternative to the most
effective method may be required.

      g. Costs. The matter of costs is of paramount importance in
any training program. Criteria relating to costs are not separate and
distinct from other factors. Obviously, time, facilities, personnel,
and the like have price tags, but there are two items which are important
enough to warrant separate consideration. First, the cost of a strategy

must be reasonable when measured against teaching effectiveness. Other factors being equal, if the expected gains in learning effectiveness of a particular strategy do not offset any additional costs incurred by the use of that strategy, a less costly, even if slightly less effective instructional strategy may be dictated. Second, savings in time, personnel, or facilities must justify the investment in the strategy. Here, the point is that an acceptable relationship between investment in the strategy and savings in other areas must exist. In sum, the cost of the strategy, regardless of its effectiveness, must under normal circumstances be offset by savings in other aspects of the training program.

B. INSTRUCTIONAL METHODS

1. The Lecture Method.
   a. Definition. A lecture is a semiformal discourse in which the instructor presents a series of events, facts, concepts, or principles, explores a problem, or explains relationships. Students participate in a lecture mainly as listeners. A lecture is basically a means of "telling" students information they need to know. This does not mean, however, that all the talking done by an instructor during a class period can be termed a lecture. The term must be reserved to describe a more formal discourse which is used to achieve an instructional objective.
   b. Uses. Fundamentally, the purpose of a lecture is to inform. The instructor has information which he wishes to transmit to students by means of oral communication. Some of the more appropriate uses of the lecture are as follows:
      (1) To orient students to course policies, rules, procedures, purposes, and learning resources.
      (2) To introduce a subject, indicate its importance, and present an overview of its scope.
      (3) To give directions on procedures for use in subsequent learning activities.
      (4) To present basic material which will provide a common background for subsequent activities.
      (5) To set the stage for a demonstration, discussion, or performance.
      (6) To illustrate the application of rules, principles, or concepts.
      (7) To review, clarify, emphasize, or summarize.
   c. Advantages. A properly planned and skillfully delivered lecture is an effective method when used in appropriate situations. The following advantages of the lecture method are some of the reasons why it is one of the most widely used methods of instruction.
      (1) Saves time. The lecture method saves time because the instructor can present more material in a given amount of time than he can by any other method.

(2) Permits flexibility of class size. The size of a class is limited only by the size of the classroom to be used or the efficiency of the public address system.

(3) Requires less rigid space requirements. The lecture can be used effectively in any type of training area, indoors or out-doors. The only requirement is that the trainees must be able to hear the lecturer.

(4) Permits adaptability. A skillful lecturer can modify or adjust his material, in terms of sequence, vocabulary, and illustrations, to meet the needs of a specific group. This makes it possible to present content which is appropriate for the educational level, training, and past experience of the class.

(5) Permits versatility. The lecture can be used for orientation, introduction, review, clarification, and summary. It can be used at any point in a course, and it can be combined easily and effectively with any other method of instruction.

(6) Permits better control over content and sequence. Because the instructor determines what is to be presented and the order of presentation, the desired coverage and sequence can be accomplished with little danger of engaging in time-consuming detours.

    d. Disadvantages.

(1) Involves one-way communication. The instructor pre-pares and presents the material. The student sits, listens, and takes notes. Most lectures therefore permit little or no interchange of ideas between the instructor and the students. All ideas presented to the class originate with the instructor.

(2) Poses problem in skill teaching. The lecture method is an inappropriate means of attempting to teach skills such as equip-ment operation.

(3) Appeals mainly to one sense. Most learning takes place through the visual sense. The lecture, even if supplemented by training aids, appeals mainly to the auditory sense. Unless the content is interesting and challenging enough to hold the attention of the class, the results are likely to fall short of the instructional goal.

(4) Contributes to student passiveness. During a lecture, students are passive. Their job is to listen. Attention is difficult to attract and retain. Outside disturbances, or mental meanderings, easily and frequently distract the students and render the lecture ineffective.

(5) Poses evaluation problems. If an instructor is to teach, rather than merely present information, he must be aware of student reactions, misconceptions, inattention, and difficulties, and he must remedy them immediately. The lecture method makes these per-ceptions difficult. Most students have acquired the ability to appear attentive, although they may not even be listening. The lecturer receives very little feedback, and much of what he does receive is often misleading.

(6) Depends on the skill of the instructor. In a lecture, student interest and attention must be generated by the instructor. The instructor must plan carefully, display sincerity and enthusiasm, present his material in proper sequence, use appropriate vocabulary, employ effective speaking techniques, be sensitive to the reaction of his audience, and modify his presentation on the basis of class response. Failure to do any of these things will result in loss of student attention and interest, and failure to achieve the objectives of the instruction. The ultimate success of a lecture depends on the skill of the instructor.

2. The Conference Method.
    a. Definition. The conference is a method in which group discussion techniques are used to reach instructional objectives. These discussion techniques include questions, answers, and comments from the instructor in combination with answers, comments, and questions from the students, and are directed toward learning goals. Basically, there are three types of conferences: directed discussion, training conferences, and seminars. No sharp lines of demarcation exist between any of these forms. However, the objectives of the conference, and the kind and amount of student participation, determine when a directed discussion becomes a training conference, and when a training conference becomes a seminar. The bases for these distinctions are as follows:
        (1) Directed discussion. Here the objective is to help students acquire better understanding and the ability is to apply known facts, principles, concepts, policies or procedures, or to provide students with an opportunity to apply this knowledge. The function of the instructor is to guide the student discussion in such a way that the facts, principles, concepts, or procedures are clearly articulated and applied.
        (2) Training conference. In a training conference, the objective is to pool the knowledge and past experience of the students to arrive at improved or more clearly stated principles, concepts, policies or procedures. The topics discussed in a training conference are less likely to have pat answers than those used in a directed discussion. The task of the instructor is to elicit contributions from the group, based on past experiences, which have a bearing on the topic at hand. Balanced participation, then, is the goal.
        (3) Seminar. The purpose of the seminar is to find an answer to a question or a solution to a problem. The instructor does not have an answer or a solution; in fact, there is no known best or correct solution. Rather, he is seeking an answer and used the group to develop one. The primary functions of the instructor are to describe the problem as he understands it and to encourage free and full participation in a discussion aimed at:
            (a) Identifying the real problem.
            (b) Gathering and analyzing data.
            (c) Formulating and testing hypotheses.
            (d) Determining and evaluating alternative courses of action.

(e) Arriving at conclusions.

(f) Making recommendations to support or arrive at a solution or a decision.

b. Uses. The conference method is a valuable tool in the instructor's kit. Some of the more important applications of this method are as follows:

(1) To develop imaginative solutions to problems.

(2) To stimulate interest and thinking, and to secure student participation in situations which would otherwise allow the class to remain passive.

(3) To emphasize the main teaching points.

(4) To supplement lectures, readings, or laboratory exercises.

(5) To determine how well students understand concepts and principles, and to determine if they are ready to proceed to new or more advanced material.

(6) To prepare students for the application of theory or procedure to specific situations.

(7) To summarize, clarify points, or review.

(8) To prepare students for instruction which is to follow.

(9) To determine student progress and the effectiveness of prior instruction.

c. Advantages.

(1) Increases student interest. The opportunity to express one's own views and to hear the opinions of others is stimulating. Interest is unusually high in a well-planned and skillfully conducted conference.

(2) Increases student acceptance and commitment. Because students actively participate in developing the lesson, they tend to accept the importance and validity of the content and are more deeply committed to problem solutions or decisions than they would be if the content were merely presented to them.

(3) Utilizes student knowledge and experience. The conference method enables the instructor to make effective use of the students' backgrounds, previously acquired knowledge, and experiences. The entire class and the instructor benefit from the experience and thinking of all students.

(4) Results in more permanent learning. Learning takes place in direct ratio to the amount of individual participation in the learning process. The conference demands a high degree of student participation, thereby promoting better and more permanent learning.

d. Disadvantages.

(1) Requires highly skilled instructors. The most important limitation is the lack of top-notch instructors who are capable of conducting true discussions. The conference is more exacting in resourcefulness, initiative, and ability of the instructor. The instructor must be able to guide the discussion without appearing to do so. He must be thoroughly informed on all aspects of the subject under discussion. The

instructor must also:

(a) Keep the discussion on the track.
(b) Minimize debate over unimportant details.
(c) Relate comments to topics previously discussed.
(d) Avoid reopening topics already discussed.
(e) Encourage and get full participation.
(f) Prevent domination by a few students.
(g) Summarize and clinch each topic.
(h) Bring the discussion to a close.

(2) Requires preparation by students. Most conferences require advance preparation, in the form of reading assignments, thinking, and study, before the meeting. The thoroughness of the preparation determines the quality of the discussion and the outcome of the conference. Little or no instructor control can be insured over the quality or thoroughness of student preparation. This results in variation among students in their readiness to participate in the conference.

(3) Limits content. The content appropriate for discussion is restricted. Manipulative operations, functions, procedures, or introductory material do not ordinarily provide suitable content for a conference.

(4) Consumes time. Relatively large blocks of time must be allocated if a discussion is to be profitable. For this reason, the conference is often ruled out as an approach although it may be well-suited to the subject and the class.

(5) Restricts size of group. The conference method cannot be used effectively with groups larger than 12 to 15 students because the opportunity for individual participation is too limited. More reticent members are likely to be left out of the discussion and denied valuable learning experience.

(6) Requires selective group composition. The members of a conference group, in most cases, must possess the proper background, maturity, and motivation if the discussion is to be profitable. The desired degree of participation is difficult to obtain if the group is composed of one subgroup which has ample experience in the area to be discussed and another subgroup has extremely limited experience.

3. The Demonstration Method.

a. Definition. A demonstration is a method of instruction where the instructor, by actually performing an operation or doing a job, shows the trainee what to do, how to do it, and through explanations, brings out why, where, and when it is done. Usually, the trainee is expected to be able to repeat the job or operation after the demonstration. For this reason, the demonstration is often used in conjunction with another method. The most common combinations are the lecture-demonstration and the demonstration-performance.

b. Uses. The basic purpose of a demonstration is to show how something is done. It should be employed wherever and whenever practicable. Here are some of its more important applications.

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(1) To teach manipulative operations or procedures; e.g., how something is done.

(2) To teach problem-solving and analytical skills.

(3) To illustrate principles; e.g., why something works.

(4) To teach operation or functioning of equipment; e.g., how something works.

(5) To teach teamwork; e.g., how men work together to do something.

(6) To set standards of workmanship.

(7) To teach safety procedures.

c. Advantages.

(1) Improved learning. Students learn faster and more permanently with a demonstration. This is due to several factors:

(a) Demonstrations make explanations concrete by giving meaning to words.

(b) Demonstrations provide perspective by showing complete performance of a procedure. Relationships between steps of the procedure and accomplishment of the objective are clarified.

(c) Demonstrations appeal to several senses. Students not only see and hear during a demonstration, they are often given the opportunity to touch the equipment.

(d) Demonstrations have dramatic appeal. When well-planned and executed, a demonstration has a dramatic quality which arouses and sustains interest and attention.

(2) Minimizes damage and waste. Equipment is often damaged when trainees attempt to operate it without proper guidance. It is also true that material is wasted by neophytes. Much of this damage and waste can be prevented by the use of demonstrations.

(3) Saves time. A properly planned demonstration takes much less student time than other methods. It reduces oral explanation time and at the same time prevents misunderstandings concerning how a system or a piece of equipment works.

(4) Can be presented to large groups. Class size is limited only by the ability of the group to see the object being demonstrated. The use of large-scale mockups or models makes it possible to teach many operations to large classes.

d. Disadvantages.

(1) Requires careful preparation and rehearsal. A demonstration should set a standard of performance for students. The procedure must be technically correct and must be performed with a skill greater than that expected of students. The instructor must be sure that his equipment is in working order. Nothing fails as completely as a demonstration that doesn't work.

(2) Requires special classroom arrangements. The demonstration room must be set up so that all students can clearly see every phase of the demonstration.

(3) Requires equipment and aids. The equipment, often expensive, must be taken out of an operational setting. Therefore, removal of this equipment must be offset by gains in training. Sometimes models or mockups must be purchased or constructed. These represent a rather costly investment of time, money, and other resources.

4. The Performance Method.
   a. Definition. A performance is a method in which the student is required to perform under controlled conditions, the operation, skill, or movement being taught. Performance is learning by doing. There are four basic types of performance.
   (1) Independent practice. In this type of performance students work individually and at their own rates.
   (2) Group performance or controlled practice. Here students work together at the rate set by the instructor, step-by-step and "by-the-numbers."
   (3) Coach and pupil. This method involves pairing students. Members of each pair perform alternately as instructor and student.
   (4) Team performance. Here, a group of students perform an operation or function which involves teamwork.
   b. Uses. In general, the performance method has the same applications as the demonstration method and is used as follow-on instruction:
   (1) To teach manipulative operations or procedures.
   (2) To teach operation or functioning of equipment.
   (3) To teach team skills.
   (4) To teach safety procedures.
   c. Advantages.
   (1) Builds confidence. Given the opportunity to apply his knowledge in a realistic situation, the student develops confidence in his ability and a positive attitude toward the learning situation.
   (2) Increases learning. Active student participation is maximized. This fact, coupled with the interest and attention generated by putting theory into practice, increases both the amount and the permanence of learning.
   (3) Enables learning evaluation. With the performance method, the instructor has an opportunity to observe the degree of learning attained by each student, to locate students having difficulty, and to determine if there have been weak areas in the instruction.
   (4) Reduces damage and waste. Because performance is guided, students are less likely to make mistakes which will damage equipment or waste material.
   (5) Promotes safety. Guided performance makes it possible to emphasize the proper method of performance and enables prevention of accidents.
   d. Disadvantages.
   (1) Requires tools and equipment. If a practical exercise is to be conducted, every student must participate fully. Therefore, tools and properly functioning equipment must be available in sufficient quantity for the size of the class.

(2) Requires large blocks of time. A well-run practical exercise is often time consuming in its requirements for setting up the room and equipment, and in accomplishing the actual setting up the room and equipment for individual or team performance of the complete operation.

(3) Requires more instructors. Unless the class is very small, a number of qualified instructors is required to keep a constant check on the progress of each student, to give assistance when needed, and to evaluate the quality of the performance.

5. Programmed Instruction.

a. Definition. Programmed instruction is a method of self-instruction in which the student works through a carefully sequenced and pretested series of steps leading to the acquisition of knowledge or skills representing the instructional objectives. The student proceeds through the program at his own rate, responds actively (or covertly) to each step in the sequence, and receives immediate feedback on the correctness of his response before proceeding to the next step. Programs are usually designed to permit the student to master the desired knowledge or skills.

b. Uses.

(1) To provide remedial instruction.

(2) To provide makeup instruction for late arrivals, absentees, or transients.

(3) To maintain previously learned skills which are not performed frequently enough to insure an acceptable level of proficiency.

(4) To provide retraining on equipment and procedures which have become obsolete or have been replaced since the original training was given.

(5) To upgrade production, administrative, or other types of skills and knowledges.

(6) To accelerate capable students and thereby enable them to complete a course in less than the usual amount of time.

(7) To provide a means of insuring enough common background among students to profit from formal classroom work (advance study).

(8) To provide the review and practice of knowledge and skills needed to "set" the learning.

(9) To provide vertical enrichment (advanced work) or horizontal enrichment (broader contact) in a content area.

(10) To control the variables in a learning situation for experimental purposes.

c. Advantages.

(1) Reduces failure rate. Basically, the reduction in failure rate is due to the fact that programs are tested and validated before they are used. This procedure insures that the program is effective in performing the instructional job. The self-pacing feature of the material also helps because students are exposed to the material at a rate which is appropriate for the individual. The "forced" response and immediate confirmation features guarantee continuous attention to the material, correct wrong responses, and prevent misinterpretation and the practice of errors.

(2) Improves end-of-course proficiency. The pretesting, self-pacing, forced attention, and immediate feedback features of programs result in better, more efficient, and more permanent learning. Thus, end-of-course proficiency is markedly increased by the use of programs.

(3) Saves time. The rigid control over content made possible by the procedures used for developing, testing, and validating programs prevents the introduction of unnecessary content and thereby reduces the time required to learn the critical material. The self-pacing feature, along with forced attention, decreases the teaching time required and frequently results in average time savings of 30 per cent or more over conventional instructional methods.

(4) Standardize instruction. The instructional content and sequence of a program are predetermined. They are not subject to the whims, preferences, experiences, or biases of the instructor. The quality of the instruction does not vary from day to day nor from instructor to instructor. There is almost complete control over the content, the sequence, and the form of student response. Hence, instruction becomes standardized and can be repeated without change at any time for any individual or group.

(5) Requires no special facilities. Programmed materials can be used anywhere a. any time. No specially equipped rooms or facilities are necessary.

(6) Provides for self-instruction. Although under ordinary conditions programs are not used as substitutes for instructors, they can be so used. Programs are validated under conditions where they alone do the teaching. Therefore, they are effective instructional materials even if no qualified instructor is available.

(7) Accommodates adaptability. Programs can be designed to accommodate wide differences in aptitude, ability, speed of learning, prior training, and experience. The needs of individuals, whether for more or less exposure, detail, or practice, can be met. The size of a class is also unimportant. Programs can be used to achieve group or individual progress.

(8) Improves efficiency and economy for group or individual instruction. The self-pacing feature and the handling of large or small groups make for greater efficiency and economy. In addition, programs free instructors from routine, repetitive teaching tasks, and enable them to spend a larger part of their time on more difficult or more demanding aspects of instruction.

  d. Disadvantages.

(1) Requires local or commercial preparation. Although the number of available programs is growing rapidly, those programs which may be used locally are limited because most programs, produced by commercial publishers or other military service schools, do not match the instructional objectives of local courses. For this reason, programs must be developed locally or contracted with commercial programming concerns.

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(2) Requires lengthy programmer training. Very few trained programmers are available locally. The training program is relatively lengthy and demanding. Only a small percentage of personnel exposed to programmer training will become competent programmers.

(3) Increases expenses. Programs, whether developed locally or contracted, are extremely costly. For local development there must be a large investment in programmer training and an even larger one in program writing, testing, and validation. Contract program development is expensive in terms of dollar outlay, and in terms of the time required by subject-matter experts and technicians for consulting with programmers and reviewing draft materials.

(4) Requires considerable leadtime. Programmed materials cannot be selected or developed overnight. A considerable amount of leadtime is required to screen and select appropriate programs from those available. If programs are developed either by staff and faculty or by contract programmers, the leadtime for production, testing, and validation is even greater. If content is unstable or subject to frequent and radical change, it is inappropriate for programming.

(5) Demands competent instructors. Instructors must be able to motivate students to complete programs. They must be able to assist any student at any point in the programmed sequence at any time. Mediocre instructors cannot meet these requirements. If instructors are to be able to provide the motivation, guidance, and assistance required for the optimum use of programmed materials, they must have:

(a) Insight into the learning process.

(b) A thorough understanding of the rationale, principles, construction, and use of programming skill in conducting tutorial-type instruction and individual counseling.

(c) A mastery of the subject-matter of the programs used.

(6) Requires mature students. The use of programs requires a student group which is mature enough and sufficiently well motivated to work more or less independently. Furthermore, they must possess reading ability at the level required for full understanding of the program.

(7) Poses administrative problems. The use of programmed materials creates unique administrative problems. Foremost among these are the scheduling and assignment problems caused by the self-pacing feature of programs. This feature results in different phase and course completion times with consequent difficulties in scheduling following instruction and assigning graduates to field units.

6. Study Assignment.

a. Definition. The study assignment is a method in which the instructor assigns readings in books, periodicals, manuals, or handouts; requires the completion of a project or research paper; or prescribes problems and exercises for the practice of a skill. This method involves imposing a task, providing for student motivation, and giving general directions for carrying out the assignment. Implicit in this method are the problems of setting up worthwhile learning activities,

and anticipating student difficulties and means of overcoming them. If these steps are not well handled, the objectives of the assignment are not likely to be achieved. The study assignment has two basic forms:

(1) Independent study. Here the student carries out the assignment without instructor assistance or direct guidance.

(2) Supervised study. In this form, the student carries out the assignment with an instructor available for guidance and assistance.

b. Uses.

(1) To orient students to a topic prior to classroom or laboratory work.

(2) To set the stage for a lecture, demonstration, or discussion; i.e., advance study.

(3) To provide for or capitalize on individual differences in ability, background, or experience through differentiated assignments.

(4) To provide for the review of material covered in class or to give the practice essential for the development of skills and problem-solving ability; i.e., homework.

(5) To provide enrichment material.

c. Advantages.

(1) Increases coverage of material. A far greater amount of material, and detailed treatment of it, can be covered in a shorter period of time by study assignments than by any other means.

(2) Reduces classroom time. Used properly, assignments can serve as a substitute for lectures: or by providing a common body of knowledge, make lectures, demonstrations, and conferences more meaningful and more productive.

(3) Improves learning. Practice is essential to the development of skills. Assignments provide a means of giving enough practice to insure mastery of the skill.

(4) Permits individualized attention. Study assignments can be designed to make use of the experience, special skills, or interests of students, or to remedy individual deficiencies in knowledge or skill.

(5) Reduces instructor interpretation. Students may be referred to the original source instead of being exposed only to the instructor's interpretation. This insures that the content will be presented as intended by the originator of the material.

d. Disadvantages.

(1) Requires careful planning and followup. If students are not well motivated, they are not likely to do a thorough job with assignments, especially those which they must do on their own. The instructor must plan and assign work in such a way that the objectives are clear, the instructions are lucid, and the motivation is present; and he must follow up to insure that the assignment has been carried out.

(2) Poses evaluation problem. The effectiveness of study assignments is difficult for an instructor to evaluate. It is also difficult for him to determine what went wrong with a study assignment when results are not as good as anticipated.

(3) Results in practice of errors. In skill development it is critical that the skill be practiced in the prescribed mode. Particularly with independent practice, there is a danger that the student will practice an incorrect procedure or error. When this occurs, a large expenditure of time is required to "unlearn" the skill and "relearn" it correctly.

(4) Produces nonstandard results. The variations in reading ability in any group and the differences in motivation produce varying degrees of learning when study assignments are used. Where standardization of learning is essential, study assignments may be inappropriate.

7. Tutoring.

a. Definition. Tutoring, or coaching, is a method of instruction in which an instructor works directly with an individual student. The method may involve exposition, demonstration, questioning, coaching, or guided practice.

b. Uses.

(1) To teach highly complex skills and operations, or operations which involve considerable danger to men or hazards to expensive equipment.

(2) To provide individualized remedial assistance.

c. Advantages.

(1) Permits adaptive instruction. With a competent instructor, tutoring provides the optimum in individualized instruction. The needs of the individual student can be diagnosed and instruction can be tailor-made to meet his unique needs.

(2) Stimulates active participation. In a tutorial setting, the highest possible degree of student participation can be achieved. Direct involvement in the learning, by answering and asking questions, by performing under supervision, is guaranteed.

(3) Promotes effectiveness. The ability of the tutor-coach to adapt his instruction to the needs of the individual, together with the high degree of interaction and participation of the student, make this method extremely effective in achieving instructional objectives.

(4) Promotes safety. The one-to-one instructor-student ratio provides close control over performance of hazardous operations, resulting in the prevention of injury to the operator or damage to the equipment.

d. Disadvantages.

(1) Requires highly competent instructors. Tutoring, or coaching, is one of the most demanding types of instruction to conduct. It requires complete mastery of the content and skill in diagnosing and remedying learning difficulties.

(2) Demands time and money. Tutoring is probably the most expensive method of teaching. Although only one student is receiving the instruction, instructor preparation and presentation time are essentially the same as they would be for a whole class of students.

8. Combination Instruction.

a. Definition. This is a method of instruction which uses two or more basic instructional approaches in combination. For example, this method for one lesson might include a study assignment, a lecture in which safety precautions in handling a piece of equipment are emphasized, a demonstration by the instructor, and, finally, performance by the students.

b. Uses. Combination lessons can be used to meet almost any type of instructional objective in any training situation. However, they are most appropriate where skill development is involved.

c. Advantages.

(1) Increases interest. The variety of approaches used in a combination lesson make for a more interesting and engaging instructional period.

(2) Promotes flexibility. The use of several approaches frees the instructor from the restricting or limiting aspects of any single method. He can easily adjust his approach to the needs of the class and the requirements of the situation.

(3) Improves learning. The combination lesson maximizes the advantages of any single method. It allows the instructor to use approaches which complement each other. This fact, plus the advantage of higher student interest, results in improved learning.

d. Disadvantages.

(1) Requires highly skilled instructors. Instructors must be able to use all methods of instruction with a high degree of skill.

(2) Requires smaller groups. The use of methods in combination requires closer control by the instructor and, its concomitant, better supervision of student activities. To obtain the desired control, classes must be kept small.

C. TYPES OF STUDENT AND INSTRUCTOR ORGANIZATION

1. Random Grouping and Assignment.

a. Definition. Random assignment of students and instructors is an organizational approach in which more or less heterogeneous groups of students are assigned to class sections, and the responsibility for conducting instruction is shared by instructors assigned to one or more academic elements. The size of the class is determined mainly by available facilities, including such considerations as seating capacity or the number of equipment positions available. Qualified instructors are assigned usually on a change or duty roster basis.

b. Applications. Although there are relatively few situations in which random assignment should be used, it can be used under the following conditions:

(1) Prerequisites for enrollment in a course are sufficiently well-defined and applied to insure the assignment of students who possess the basic aptitudes, abilities, education, prior training or experience essential to successful progress in the course.

(2) Standards of instructor qualification, in terms of both _technical_ knowledge and _teaching_ skills, are set high enough to insure an acceptable level of teaching competence among all instructors.

(3) The content to be presented is completely new to the students and is presented primarily as an orientation or introduction.

(4) The accomplishment of the objectives of the instruction depends upon a great variation in the backgrounds and experience of the students; e.g., some aspect of problem-solving.

(5) A wide range of abilities, aptitudes, education, training, and experience is of little consequence; e.g., introductory materials or orientations.

c. _Advantages_.

(1) Simplifies scheduling. With this system, scheduling and assignment of students and instructors is relatively uncomplicated. It simply involves matching classes with instructors, training space, and equipment. Variables which must be taken into account in other forms of organization can be ignored.

(2) Simplifies planning. Although planning for any subject in a course cannot be undertaken without reference to other blocks of instruction in the same course, there is less need for cooperative planning by all instructors under the random system.

(3) Permits appraisal of instruction. Because each instructor is largely responsible for the planning and conduct of instruction in a specific content area, it is relatively easy to identify deficiencies which result in failure to achieve instructional objectives.

d. _Disadvantages_.

(1) Reduces flexibility. With random organization, the length of instructional periods must be standard if scheduling difficulties are to be avoided. Sometimes, a 30-minute period is enough to complete the instructional job, but if periods are standardized at 50 minutes, the instructor must pad the instruction to fill the time. At other times, a 50-minute period does not provide enough time, and the instructor must compress his presentation to fit the time available.

(2) Reduces attention to individual differences. Regardless of the rigidity of prerequisites for enrollment in any training program, wide variations in student aptitude, ability, education, training, and experiences are unavoidable. Although the level of the instruction may be set in terms of the prerequisites, the instructor will be dealing with the mythical "average" student. The level may be too high and the pace too fast for some, or it may be just the opposite for others.

(3) Increases the danger of gaps, overlaps, and duplication. Because each lesson is planned and conducted mainly by one instructor, gaps, overlaps, and duplication of instruction are inevitable. They are difficult to identify and costly to remedy.

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(4) Depends on instructor ability. The effectiveness of instruction varies with the ability of the instructor. Even where a minimum acceptable standard of instructor competence has been established, there is a wide range of expertise involved. Yet, the effectiveness of the instructor depends mainly on his ability, acting more or less on his own, to plan and conduct the instruction. The variability of the groups complicates the problem.

2. Homogeneous Grouping.

a. Definition. A homogeneous group is one which is characterized by uniformity in achievement, ability, aptitude, background, education, training, or experience. With this type of grouping, students are assigned to a class on the basis of selection instruments or devices which indicate that they are alike in specific attributes, traits, or abilities. Although it cannot be assumed that they are undiversified solely on the selection factor, a "narrower range" of diversification is established. It should be noted that a group composed of students with identical scores on an aptitude test will not only be different in that aptitude (because of errors of measurement) but they will vary almost as widely as a randomly selected group on any other selection factor (ability, experience, prior training, etc.).

b. Uses.

(1) To provide remedial assistance to students.

(2) To provide a means of accelerating students who are fast learners; and therefore enable them to complete a course of instruction quicker.

(3) To provide faster, more able, or more experienced students with more advanced work in a subject, or broader contact with a content area.

c. Advantages.

(1) Permits more suitable instruction. The reduced variability of the group makes it possible for the instructor to present content and to use strategies which are most appropriate for the ability, aptitude, education, training, or experience of the group.

(2) Allows faster and more complete coverage of material. The reduced variability of the group enables the instructor to pitch his instruction at the proper level and pace for the group.

(3) Increases interest and participation. Homogeneous groups are typically smaller than randomly selected groups. This makes it possible to obtain greater individual attention and student participation in learning activities.

(4) Permits better learning evaluation. The smaller number of students increases instructor opportunity to evaluate progress toward learning goals.

(5) Reduces failure rate. Because instruction can be given at an appropriate level for the students in a group, even if they are slow learners, the group can achieve the learning objectives.

d. Disadvantages.
(1) Increases expense. For homogeneous grouping there must be an investment of time and money in selecting and using screening techniques and devices. In addition, smaller classes result in smaller student-instructor ratios; i.e., more instructors are required to handle the groups.

(2) Poses problems of grouping. As pointed out earlier, selection of students on one basis of similarity does not mean that students are similar in all other traits and abilities. If a combination of traits and abilities is needed, it is extremely difficult to achieve any realistic degree of homogeneity.

(3) Complicates scheduling and assignment. The increased number of groups increases the scheduling of classes and the assignment of students and instructors.

3. Team Teaching.
a. Definition. Team teaching is a system of organization utilizing a team of instructors, two to eight in number. One member is designated as the team leader and the others, who represent a range of subject-matter and teaching competencies, jointly plan, conduct, and evaluate all learning activities for a relatively large group of students. The total student group may be taught simultaneously for some lessons and divided into smaller groups for other instruction.

b. Uses. Team teaching can be used with any type content, at any level, and for any instructional purpose. However, it is primarily used as follows:
(1) To handle large and diversified groups of students efficiently.

(2) To maximize the use of available instructor knowledge and skills.

(3) To provide a means of dealing with individual differences in student achievement, ability, aptitude, educational level, prior training, and experience.

c. Advantages.
(1) Increases effectiveness of instruction. Improved instructional effectiveness is enhanced by the cooperative planning of a team of instructors, instruction by the most technically qualified instructor, use of the best method for reaching the objective, increased opportunity for student participation, and attention to individual differences.

(2) Promotes efficiency. Team teaching permits maximum utilization of the talents of instructors. Instructors are assigned tasks which are commensurate with their technical knowledge, experience, and teaching skills. Routine teaching and administrative tasks can be assigned to less skilled members of the team thereby reserving the highly skilled instructors for more demanding instructional jobs.

(3) Permits flexibility. This system of organization permits variations in both the size of student groups and in the length of instructional periods. Students can be regrouped in accordance with their needs. The result is a degree of flexibility and responsiveness which is achievable with few other approaches.

d. Disadvantages.

(1) Requires team planning time. The success of team teaching depends on the quality of planning. Time must be available prior to and during the course for coordination and planning by members of the team.

(2) Requires teamwork. Each instructor serving as a member of a team must be able to work effectively with the other members, know his job, know what other members of the team are doing, and be able to interact with the team.

(3) Requires special training. Because team teaching has not been used to any great extent in military schools, the roles of team members must be defined, and training in performing these roles must be provided to each member.

4. Team Learning.

a. Definition. Team learning is a form of organization in which a group of students, under one instructor, is subdivided into smaller groups or teams for instruction. Under the supervision of the instructor, these teams engage in learning activities of a variety of types aimed at the development of verbal and manipulative skills.

b. Uses. Team learning can be used as a means of achieving many types of instructional objectives, for any group, and with any content. Primarily, team learning is used for the following:

(1) To handle individual differences in student achievement, ability, aptitude, educational level, prior training, and experience.

(2) To teach tactical movements and team skills.

(3) To provide guided practice in developing verbal or manipulative skills.

(4) To develop problem-solving ability.

c. Advantages.

(1) Increases effectiveness of instruction. Team learning enhances the effectiveness of instruction because it employs a variety of methods, emphasizes student activity, and provides for individual differences.

(2) Promotes flexibility. This form of organization permits changes in the size and composition of subgroups to meet the needs of the individual. Time can also be allocated to activities as needed.

(3) Requires fewer instructors. While all activities of the group are planned with the guidance and assistance of the instructor, the group and subgroups teach themselves. There is less formal presentation by the instructor.

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d. Disadvantages.
(1) Requires skilled instructors. A team learning instructor must have mastery of the subject-matter, be proficient in the skills being taught, and be accomplished in carrying out all methods an' techniques of teaching. Few military instructors have had the training and experience required to use this system successfully.

(2) Produces nonstandard results. The graduates of a course operated under the team learning concept are likely to show a great amount of variation in terms of job knowledge and proficiency because no two students have been exposed to identical content or· learning experiences.

D. MEDIATING DEVICES

1. Teaching Machines.
a. Definition.
(1) A teaching machine is any mechanical, electrical, or electronic device which provides instruction to a student without the direct participation of a human instructor. Devices of this type simulate, in one way or another, the functions normally fulfilled by a teacher. They contain instructional material, present it in steps, provide a means for the student to respond, and they provide the student with immediate information regarding the correctness of his response. In addition, some machines perform the following functions:
(a) Discriminate the correctness of the student's response.

(b) Automatically advance the program.

(c) Provide random access to teaching frames.

(d) Retain those frames on which errors have been made for further presentation.

(e) Record and tabulate correct and incorrect responses.

(f) Select and present content based on evaluation of previous responses.

(g) Permit two-way communication between student and machine.

(2) The media used include printed material, projected material, visual or audio signal, or a combination thereof. The response medium may be pencil, stylus, typewriter, key, lever, pushbutton, switch, light gun, the spoken word, or any appropriate combination.
b. Uses.
(1) To supplement other instructional methods of teaching by providing a means of advance study, practice, remedial work, makeup instruction, review, maintenance drill, acceleration, or enrichment material.

(2) To substitute for conventional teaching methods in teaching facts, concepts, principles, or skills, and thereby relieve the instructor of repetitive or routine teaching tasks.

(3) To control instructional materials during the development and validation stage.

(4) To insure complete control over the sequence of instruction, the form of student response, and the immediate correction of errors.

c. Advantages.

(1) Increases student interest. Gadgetry is extremely effective in engaging and holding student attention. Although prolonged use of teaching machines may result in a deterioration of student interest, it occurs much slower than with more conventional methods.

(2) Provides for active response. With a machine, activity of the learner, whether writing, speaking, or manipulating levers and buttons, is insured. When the student stops responding, the instruction stops.

(3) Improves learning. Because the material in a machine is programmed and self-paced, it has the same capacity as programmed instruction for reducing failure rate, for raising end-of-course proficiency, for reducing course completion time, and for standardizing instruction.

(4) Eliminates instructor requirement. A reliable and well-designed machine with a fully validated program does not require an instructor. This fact permits the use of instructors for more difficult and demanding types of instruction.

d. Disadvantages.

(1) Increases expense. Machines are expensive in terms of capital outlay and often in terms of maintenance.

(2) Lacks appropriate programs. There are so many types of machines on the market, and so few programs, that it is difficult to match existing programs and machines. Frequently, it is necessary to reproduce a program in a format acceptable for an available machine. This is an expensive and time-consuming process.

(3) Poses administrative problems. The problems of scheduling and assignment caused by the self-pacing feature of programmed materials are just as outstanding with teaching machines as they are with book format programs. Added to these are the unique storage, maintenance, and repair problems of machines.

2. Student Response System.

a. Definition. A student response system is an electrical or electronic means of establishing two-way communication and interaction between an instructional program (or an instructor) and students. Systems of this type are designed to be used by the classroom instructor, in conjunction with mass media such as motion pictures and television, and magnetic tape recordings, lectures, and demonstrations. Periodically throughout the presentation, each student in the group is simultaneously asked to respond to questions. Responses may be recorded on IBM cards or paper rolls which are automatically advanced before the correct answer is given. Multiple choice questions may be handled by depressing keys. In this way, response data are recorded and tabulated

and the student receives immediate feedback from the instructor or by means of indicator lights. Similarly, the instructor can have his teaching effectiveness immediately evaluated, at any time, by means of error counters or meters which indicate the percentage of correct responses to his questions.

b. Uses. Student response devices combined with lectures, demonstrations, audio or video-tape recordings, or the mass media may be used:

(1) To replace an instructor by use of the equipment in its preprogrammed automatic mode which prerecords all audio and visual stimuli, including questions, and which provides equipment control of the presentation.

(2) As an aid to instruction where control over the sequence, pace, and coverage of the material is controlled by the instructor.

c. Advantages.

(1) Improves instruction. Because instruction is carefully planned and preprogrammed, it is more effective. In addition, the instructor receives immediate and specific feedback from the students, as necessary, throughout his lecture or demonstration. He can then improve his presentation as he proceeds by clarifying points that have been misunderstood.

(2) Improves student learning. The requirement for periodic individual student responses to questions by means of the response device enhances student attention, provides immediate feedback, and thereby improves student learning.

(3) Permits larger classes. The size of the group that can be handled is limited only by the number of response devices installed in the classroom.

(4) Allows for standardization. In its automatic programmed mode, the equipment can present the same material, in the same sequence to many groups of students.

d. Disadvantages.

(1) Depends on skill of instructor. The instructor must not only be a highly skilled lecturer or demonstrator, he must also ask effective diagnostic questions, and clarify, on-the-spot, any misunderstandings. In short, he must be fluent and flexible.

(2) Increases expense. Because of the expensiveness of these devices, they must be used frequently and judiciously to realize an appropriate return from the investment.

(3) Requires instructor training. Instructors must be trained to insure that lectures and demonstrations are programmed for effective presentation, and that questions are properly framed, developed well in advance, and inserted at the proper point in the instructional sequences.

3. Computer-based Instructional Systems.

a. Definition. A computer-based instructional system consists of a teaching machine and associated equipment which includes a digital computer as one of its components. The computer permits individual instruction of upwards of 200 students simultaneously. The stimulus may be on cathode-ray tube, typewriter printout, or audio signal. Responses may be made by typewriter, light pen, or keyboard. The computer may have the capability of regulating the difficulty of the problems, the rate of presentation, and the type of material presented based on the past performance of the individual. As the student progresses, the speed and difficulty of the program increase automatically; if the student slows down or exceeds a predetermined error rate, the computer adjusts the program accordingly. In addition, a record of responses can be maintained. The computer-based system can provide the ultimate in machine instruction by engaging the student in a mutually responsive conversation, communicated through a typewriter keyboard.

b. Uses.

(1) To teach students to perform complex analytical tasks.

(2) To provide automated and individualized drill in manual or manipulative skills.

(3) To teach deductive inference and advanced problem-solving techniques by conversational interaction and/or simulation.

c. Advantages.

(1) Improves learning. The computer-based instructional system, because it is self-paced, has the same student learning advantages as programmed instruction and teaching machines.

(2) Permits flexibility. The computer has the additional advantages of speed of reaction, ability to adjust the program to the individual, and the capacity to handle relatively large groups of students simultaneously.

(3) Increases learning speed. Use of a computer-based system speeds learning because it presents pertinent information to the student without time-consuming detours.

d. Disadvantages.

(1) Increases expense. Computer-based systems are elaborate, hence require a large investment for purchase or rental and for installation and maintenance.

(2) Poses programming difficulties. Programs are difficult to design because of their inherent complexity. Both qualified computer programmers and programmed instruction programmers are required to develop instructional materials. Therefore, the development of a program production capability locally, or contractually, is required.

5. Closed-circuit Television Systems.

a. Definition. A closed-circuit television system consists of one or more television cameras (with associated control equipment), lighting equipment, audio equipment, film chains, video tape recorders, a distribution system which makes use of coaxial cable or microwave for

the transmission of picture and sound, and receivers. Closed-circuit television, therefore, is distinguished from broadcast television by the method used to distribute the picture and sound. With broadcast TV, a transmission distributes the signal in all directions.

b. Characteristics. Closed-circuit television (and video-tape recordings) has several characteristics of great significance for training purposes.

(1) It has the quality of indefinite extension; that is, once the cost of production has been met, instructional television can be used with as many classes, either simultaneously or sequentially, as there are receivers available.

(2) It communicates sound.

(3) It is a visual medium, making it ideally suited for showing objects, processes, maneuvers, and their interrelationships.

(4) Television transmits action; it is a dynamic medium.

(5) It has immediacy, a quality which heightens its "real-world" character and adds to its impact.

(6) It is an inclusive medium; it can transmit nearly all of the other audiovisual materials; i.e., films, slides, charts, etc.

c. Uses.

(1) To teach operation and functioning of equipment.

(2) To teach individual and team skills.

(3) To bring live (and sometimes dangerous) demonstrations into the classroom.

(4) To give closeup magnification of small equipment parts.

(5) To compare objects simultaneously.

(6) To integrate films, graphics, or other training aids into an instructional sequence.

(7) To handle large groups at dispersed locations simultaneously.

(8) To repeat instruction.

(9) To provide a means of exchanging instruction (kinescope or video-tape).

d. Advantages.

(1) Promotes the direct address technique. With instructional television the instructor teaches to the camera; therefore, every viewer, regardless of where he is sitting in the classroom, is being talked to personally. Research has demonstrated conclusively that such "eye-contact" is one of the most effective techniques for inducing learning.

(2) Projects personality. Television projects personality because of direct address and the use of closeups. If the TV instructor has an effective and outgoing personality, he can make personal contact with his viewers and imbue the content with personal meaning.

(3) Provides visual magnification. The ability of TV to magnify even the smallest objects through closeups or microscopic projection is one of its greatest advantages. With TV everyone has a front-row seat.

(4) Increases selectivity. TV represents selective attention. It focuses the students' attention to the screen and tends to reduce the amount of random attention so characteristic of conventional instruction. TV is also selective in that it represents edited reality. A carefully prepared lesson, televised skillfully, eliminates extraneous material and deals only with significant instructional points and the examples which illustrate them.

(5) Promotes efficiency. Due to the manner in which TV productions are planned and produced, they are more efficient than conventional lessons. A presentation which takes 50 minutes by conventional means can be covered efficiently in a 20-30 minute TV version. Primarily this is because the production is carefully planned, nonessential material is deleted, visuals are presented without wasted motion, and the instructor does not wander away from the carefully rehearsed script.

(6) Strengthens impact. TV presentations have more impact on learners than conventional lecture or demonstration. This is due partly to the special technical capabilities of TV (magnification, amplification, superimposition, split-screen, rapid changes in perspective, and the optimal integration of a variety of audio-visual aids) and partly to the fact that the instruction is presented by an expert, backed up by a TV production team of technical experts.

(7) Provides standardization. Once a TV lesson has been recorded on video-tape (or kinescope) it can be replayed as frequently as necessary. Each student is therefore exposed to the identical instruction.

e. Disadvantages.

(1) Limits detail. Whether the TV screen is large or small, it still consists of only the amount of detail which the number of lines and the resolution of the receiving set can convey. This, at best, is considerably less than real-life visibility. For this reason, TV primarily uses medium range and closeup shots. Long shots are used rarely, and then only for viewer orientation. This limitation restricts the amount of written material presented and makes necessary the use of very simple charts, diagrams, and other visuals.

(2) Limits contrast. The TV camera has difficulty in handling strong contrasts; it produces the best pictures when it deals with a somewhat limited grey scale. This means that visuals and illustrations must be specially prepared (or treated) for TV use.

(3) Provides one-way communication. The most commonly noted limitation of TV is the fact that it is one-way communication. The studio instructor misses the immediate feedback from the students and the clues it provides for pacing, for increasing or lessening the amount of detail, and for repetition of difficult concepts or ideas. The student is likely to feel cut off from personal communication with the studio instructor because he can't break in with a question or ask for amplification of a point.

(4) Instructor paced. A TV lesson cannot be interrupted, slowed down, or speeded up. The pace is set by the TV instructor for the average student. It may be too rapid for the slow learner and too slow for the bright student.

(5) Security. The presentation of classified material requires special precautions and places restrictions on the production and viewing of materials.

(6) Increases cost. The high installation, production, and maintenance costs make it necessary to select carefully the instructional materials to be presented by TV.

E. PROCEDURES

1. Advance Preparation. The process of selecting instructional strategies cannot be set forth as a series of routine steps which anyone can follow. Selecting strategies involves so many variables that the process is extremely complex. Strategy decisions therefore must be based primarily on professional and considered judgment following careful weighing of all factors. To do this well, the instructor must have a thorough knowledge of methods of instruction, systems of organization, and mediating devices, to include an understanding of their uses, advantages, and limitations. For this reason, the first step in the selection process is to review sections A through E of this chapter. Paragraphs 2 and 3 of this section describe a method of arriving at a final choice of strategy. It is deceptively simple. However, there are many judgments involved. For this reason, the procedures must be viewed only as guides. The appropriateness of strategies selected, even using the procedures as defined, still hinges on the quality of the judgments made.

2. Preliminary Selection.
a. Study the performance objective for the specific block of instruction as entered on the "Performance Objective Listing." Note carefully:

(1) What the student is to be able to do following the instruction.

(2) The conditions under which he must perform.

(3) The criterion of successful performance.

b. Compare the behavior described in the performance objective with items 1a through u in the "criteria" column of the "Guide to the Selection of Instructional Strategies" at annex A. When you have found the item which most closely matches the objective of your instructional block, note the primary and supporting methods in columns 2 and 3 and the organizational system identified in column 5. The mediating device identified in column 4 is not essential to the use of the method.

3. Final Selection.

    a. Procedure. Check your tentative selection of method against each of the criteria listed in paragraphs 2 through 7 of the Guide to the Selection of Instructional Strategies. If the item describes the type of content your instruction deals with; the type of student you will have in your class; the instructor considerations that apply; or the facilities, equipment, materials, and time factors that bear; but the primary method entered in column 2 does not match your original selection, go back to the objective and select an alternative method from column 6. Recheck this method against all applicable criteria in paragraphs 2 through 7.

    b. Example. Objective: Without using references, and with a time limit of 5 minutes, the student must be able to calculate the resistance of a resistor of unknown value using the Wheatstone Bridge circuit.

        (1) The "type" training objective in the Guide which most closely matches this objective is Criterion 1n. The primary method recommended (column 2) is programmed instruction (PI) followed by a practical exercise (column 3). It so happens that a program is available to teach this skill. Now, check paragraph 2 of the criteria. Items a, d, f, g, i, j, and 1 apply. Note that for each criterion, PI is either the primary or an alternative method recommended.

        (2) Now check paragraph 3. Criteria b, c, d, and e apply. Again either the primary or alternative methods include PI. Check paragraphs 4 through 7 in the same way.

        (3) Suppose, however, that a programmed course is not available. Check column 6 for Criterion 1n to find the alternative method. The method recommended is a lecture demonstration on closed-circuit television (kinescope or video-tape recording). No such recording is available. The second alternative is a combination lecture-demonstration-practical exercise using any grouping. This is one method you could select. Here is where judgment again enters the picture. There are other alternatives, and all of them must be considered before a decision is made.

F. REFERENCES

1. FM 21-6.

2. Staton, Thomas F., How to Instruct Successfully, McGraw-Hill Book Company, New York, 1960, chapters 5-7.

3. Pickard, Edward E., The Military Instructor, Military Service Publishing Company, Harrisburg, Pennsylvania, 1954, chapters 11, 12, 17, 18, 19.

Annex A

GUIDE TO THE SELECTION
OF INSTRUCTIONAL STRATEGIES

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
1. TRAINING OBJECTIVES								
a. To orient students to policies, rules, course purposes, learning resources, or the like.	L	C	SRS	ANY	L PI SA	C C C	CCTV TM -	RG RG ANY
b. To introduce a subject, indicate its importance and present an overview of its scope.	L	C	SRS	ANY	L PI	C C	CCTV TM	RG RG
c. To give directions to students on procedures to use in subsequent learning activities.	L	C	SRS	ANY	SA	C	-	RG
d. To provide individualized remedial assistance.	PI	T	TM	ANY	T	PE	-	-
e. To illustrate the applica- tion of rules, principles, or pro- cedures.	D	PE	-	ANY	D	PE	CCTV	ANY
f. To provide a means of accelerating individual trainees.	PI	PE	TM	ANY	PI COM COM T	PE - - PE	CBIS - - -	ANY TT TL -

Key:
L - Lecture
C - Conference
D - Demonstration
PE - Practical Exercise

PI - Programmed Instruction
SA - Study Assignment
T   - Tutoring
COM - Combination Instruction

RG - Random Grouping and Assignment
HG - Homogeneous Grouping
TT - Team Teaching
TL - Team Learning

TM   - Teaching Machines
SRS - Student Response System
CBIS - Computer-based Instruc- tional System
CCTV - Closed-circuit Television

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Annex A (cont)

| CRITERIA | PRIMARY STRATEGIES | | | | ALTERNATIVE STRATEGIES | | | |
| | PRIMARY METHOD | SUPPORTING METHOD | MEDIATING DEVICE | ORGANIZATIONAL SYSTEM | ALTERNATIVE METHOD | SUPPORTING METHOD | MEDIATING DEVICE | ORGANIZATIONAL SYSTEM |
1	2	3	4	5	6	7	8	9
g. To provide more advanced work in a subject for faster, more able, or more experienced students (vertical enrichment).	PI	PE	TM	ANY	COM COM SA	- - -	- - -	TI TL ANY
h. To provide broader contact with a content area for faster, more able, or more experienced students (horizontal enrichment).	PI	PE	TM	ANY	COM COM SA	- -	- -	TI TL ANY
i. To provide an alternate means of learning for absentees (make-up instruction).	PI	PE	TM	ANY	T SA	- -	- -	- -
j. To build required common background for in-class study of a subject (advance study).	PI	C	TM	ANY	SA	C	-	-
k. To provide review of content or practice of skills taught in class (homework).	PI	PE	TM	ANY	SA	PE	-	-
l. To provide a pattern for later performance and to set standards for that practice.	D	PE	SRS	ANY	D	PE	CCTV	ANY
m. To teach manual or manipulative operations including the use of tools and test equipment, assembly, disassembly, or repair of equipment.	PE	D	-	ANY	PE PE PI	PI D PE	TM - CBIS	ANY TL ANY

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Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM
1	2	3	4	5	6	7	8	9
n. To teach principles or theories (why something works).	PI	PE	TM	ANY	L COM COM	D - -	CCTV - -	ANY ANY TT
o. To teach operation and functioning of equipment (how something works).	PI	PE	TM	ANY	L COM COM	D - -	CCTV - -	ANY ANY TT
p. To teach the execution of tactical movements or team skills.	PE	D	-	ANY	D COM	C -	CCTV -	ANY TL
q. To teach use or control of the voice, balance, breath, or muscles.	PE	D	-	ANY	PE PE	D -	TM CBIS	ANY ANY
r. To stimulate student interest and thinking through group participation.	C	-	-	RG	C	-	-	TL
s. To make use of students' past experience in collecting facts and ideas for the solution of a problem.	C	SA	-	RG	C	SA	-	TL
t. To teach safety procedures.	D	PE	CCTV	ANY	COM T	- PE	- -	TL -
u. To improve reasoning and problem-solving abilities.	C	SA	-	ANY	C PI	SA C	- TM	TL ANY

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CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM
1	2	3	4	5	6	7	8	5
v. To illustrate the application of concepts and principles.	D	C	SRS	ANY	D D	C C	CCTV -	ANY TT
w. To provide for maintenance of a skill.	PE	-	-	ANY	PI	-	TM	ANY
x. To review, clarify, emphasize, or summarize material.	L	C	SRS	ANY	L PI	C C	CCTV TM	ANY ANY
y. To evaluate learning.	PE	C	SRS	ANY	-	-	-	-
z. To control learning conditions for experimental purposes.	PI	PE	TM	ANY	PI L	PE D	CBIS CCTV	ANY ANY
2. CONTENT								
a. Deals mainly with concepts and principles.	PI	C	TM	ANY	L L COM	D D -	SRS CCTV -	ANY ANY TT
b. Deals mainly with reasoning and problem-solving.	C	SA	-	ANY	SA PI	- C	- TM	ANY ANY
c. Deals mainly with manual or manipulative operations.	PE	D	-	ANY	PE PE PI	PI D PE	TM - CBIS	ANY TL ANY
d. Requires intensive indi- vidual practice.	PE	D	-	ANY	PI PI SA	PE PE -	TM CBIS -	ANY ANY -

Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
e. Requires intensive team practice.	PE	D	-	ANY	PE	-	-	TL
f. Deals with materials which require visual or auditory illustration.	L	D	SRS	ANY	L PI	D -	CCTV TM	ANY ANY
g. Requires control over performance to prevent the practice of errors.	PE	D	-	ANY	PI PI	PE PE	TM CBIS	ANY ANY
h. Involves hazard to men or equipment.	D	PE	CCTV	Small Group	T	PE	-	.
i. Requires absolute control over the sequence of presentation.	PI	PE	TM	ANY	L PI	D PE	CCTV/SRS CBIS	ANY ANY
j. Demands absolute control over the form of the student's response.	PI	PE	TM	ANY	PI T	PE PE	CBIS/SRS -	ANY .
k. Lends itself to oral presentation.	L	D,C	SRS	ANY	L COM PI	D - -	CCTV . TM	ANY TL ANY
l. Is relatively stable.	PI	PE	TM	ANY	PI L	PE D	CBIS CCTV	ANY ANY
m. Is subject to frequent and radical change.	L	D	SRS	ANY	C COM COM	. . .	. . .	ANY TL TL

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CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM
1	2	3	4	5	6	7	8	9
3. TRAINEE POPULATION								
a. Is relatively homogeneous in terms of aptitude, ability, speed of learning, prior training, or experience.	L	D	SRS	HG	L	D	CCTV	HG
b. Has wide differences in aptitude, ability, speed of learning, prior training, or experience.	PI	PE	TM	RG	PI / COM / CCM	PE / - / -	CBIS / - / -	RG / TT / TL
c. Is mature enough and sufficiently motivated to work more or less independently.	PI	PE	TM	ANY	COM / SA	- / -	- / -	TL / ANY
d. Has the level of reading ability required to deal with the instructional material.	FI	-	TM	HG	CCM / SA	- / -	- / -	TL / HG
e. Is relatively large in numbers.	PI	-	TM	RG	L / L / COM	D / D / -	SRS / CCTV / -	RG / RG / TL/TL
f. Is relatively small in numbers.	D / C / PE	PE / - / -	. / . / .	ANY / ANY / ANY	COM	-	-	TL/TT
g. Has experiences, backgrounds, or prior training which are germane to the content.	C	-	.	HG	PE / COM	D / -	- / -	HG / TL

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Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA- TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
h. Has sufficient skill to put opinions, ideas, and experiences into words.	C	-	-	ANY	-	-	-	-
i. Has been prepared for the instruction by reading, lecture, or demonstration.	PE	-	-	ANY	C	-	-	ANY
4. INSTRUCTORS								
a. Technically qualified.	L D PE PI C T	D PE - PE - -	SRS SRS TM - -	ANY ANY ANY ANY - ANY	COM T	- -	- -	TT -
b. Pedagogically qualified.	L D PE C T	D PE - - -	SRS SRS - - -	ANY ANY ANY -	L COM COM T	D - - -	CCTV - - -	ANY TL TT -
c. Available in sufficient numbers.	L D PE C T	D PE - - -	SRS SRS - - -	ANY ANY ANY -	T	-	-	-
d. In short supply or unavailable.	PI	PE	TM	ANY	PI	PE	CBIS/SRS	ANY

Annex A (cont)

| | PRIMARY STRATEGIES | | | | ALTERNATIVE STRATEGIES | | | |
| CRITERIA | PRIMARY METHOD | SUPPORTING METHOD | MEDIATING DEVICE | ORGANIZA-TIONAL SYSTEM | ALTERNATIVE METHOD | SUPPORTING METHOD | MEDIATING DEVICE | ORGANIZA-TIONAL SYSTEM |
1	2	3	4	5	6	7	8	9
c. Polished speakers.	L D	D PE	SRS SRS	ANY ANY	L CGM	D -	CCTV -	ANY TT
f. Competent leaders of group discussion.	C	-	-	ANY	-	-	-	-
g. Carefully rehearsed.	L D	D PE	SRS SRS	ANY ANY	L	D	CCTV	ANY
h. Skilled in the use of individual tutoring techniques.	PI	PE	TM	ANY	T	-	-	-
i. Have adequate time for planning.	L	D	SRS	ANY	L CCM COM	D - -	CCTV - -	ANY TT TL
j. Able to work effectively as members of a team.	CCM	-	-	TT	-	-	-	-
k. Masters of a variety of methods and techniques of teaching.	CCM	-	-	TL	-	-	-	-
5. FACILITIES, EQUIPMENT, AND MATERIALS a. Centralized classroom or laboratory facilities are available	L D PE C	D PE - -	SRS SRS - -	ANY ANY ANY ANY	COM	-	-	ANY

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Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
b. Centralized facilities are in short supply or lacking.	PI	PE	TM	-	SA	C	-	-
c. Appropriate training aids are available.	L D	D PE	SRS SRS	ANT ANT	L COM COM	D - -	CCTV - -	ANT TT TL
d. Seating permits face-to-face communication.	C	-	-	ANT	COM	-	-	TL
e. Equipment components are large enough for all trainees to see them clearly.	D	-	SRS	ANT	-	-	-	-
f. Equipment components are too small for all trainees to see them clearly.	D	-	-	SMALL GROUP	D	-	CCTV	ANT
g. Expense of required mockups is justified.	D	-	-	ANY	COM D	- -	- CCTV	TL ANT
h. Equipment and materials are in adequate supply.	D PE PI	PE - PE	SRS - TM	ANT ANT ANT	COM	-	-	TL
i. Safety precautions are adequate.	D PE	PE -	SRS -	ANT ANT	COM COM	- -	- -	TL TT

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Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
j. The training area is so arranged as to facilitate close supervision of the trainees.	PE	-	-	ANT	CONF	-	-	TL
k. Each student has adequate working space.	PE	-	-	ANT	CONF	-	-	TL
l. Furniture is movable.	C	-	-	ANT	CONF	-	-	TL
6. TIME								
a. A large amount of material must be taught in a short period of time.	L	D	SRS	PG	PI L CONF	- D -	TM CCTV -	ANT ANT TT
b. A minimum amount of lead time is available for the preparation of instruction and instructional materials.	L D C	D PE -	SRS SRS -	ANT ANT ANT	CONF	-	-	TT
c. Lead time for the preparation of instruction and instructional materials is plentiful.	PI	CONF	TM	ANT	L D CONF CONF	- - - -	CCTV CCTV - -	ANT ANT TT TL
d. Personnel must complete training at the same time.	L D PE C	D PE - -	SRS SRS - -	PG/PG PG/PG PG/PG PG/PG	L D CONF CONF	- - - -	CCTV CCTV - -	PG/PG PG/PG PG/PG PG/PG

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Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZATIONAL SYSTEM
1	2	3	4	5	6	7	8	9
e. Different course completion times are not critical to subsequent training or assignments.	PI	COM	TM	ANY	PI COM	- -	CBIS -	ANY TL
7. OTHER								
a. Individual and continuous student progress is essential.	PI	PE	TM	ANY	PI COM	PE -	CBIS -	ANY TL
b. Active student response is critical to learning.	PI PE	PE -	TM -	ANY ANY	PI L C	PE D -	CBIS SRS -	ANY ANY ANY
c. Active student response is not critical to learning.	L D	D -	- -	ANY ANY				
d. Standardization of instruction is critical.	PI	PE	TM	ANY	L PI	D PE	CCTV CBIS	ANY ANY
e. Standardization of instruction is not desired.	COM	-	-	TL	SA	C	-	ANY
f. Mastery of a skill is critical.	PE	-	-	SMALL GROUP	PI PI	PE PE	TM CBIS	ANY ANY
g. An accurate record of student responses is needed.	PI PI	PE PE	TM CBIS	ANY ANY	L D	D -	SRS SRS	ANY ANY
h. Immediate correction of errors is critical.	PI PI PE	PE PE -	TM/SRS CBIS -	ANY ANY ANY	L D	D -	SRS SRS	ANY ANY

Annex A (cont)

CRITERIA	PRIMARY STRATEGIES				ALTERNATIVE STRATEGIES			
	PRIMARY METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM	ALTERNATIVE METHOD	SUPPORTING METHOD	MEDIATING DEVICE	ORGANIZA-TIONAL SYSTEM
1	2	3	4	5	6	7	8	9
1. Problems of integration with other instructional strategies are not critical.	PI PI PE	PE PE -	TM CBIS -	ANY ANY ANY	L	D	CCTV	ANY

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CHAPTER 8

SELECTING AND PREPARING TRAINING AIDS

A. INTRODUCTION

1. The Need for Training Aids. The basis for all learning is experience, and the most effective and permanent learning is derived from concrete, direct experience. However, it is not always possible to provide first-hand experiences for students. Often, the instructor must resort to an economical means of communicating facts and ideas, the use of words both spoken and written. But, the use of words alone cannot provide the vivid, realistic experience required for optimal learning. Words must be supplemented and reinforced by other media. The wise selection and proper use of a variety of audio-visual materials can fill much of the gap between verbalization and real-life, direct experience. For this reason, training aids are an essential means of increasing the efficiency and effectiveness of training. Good training aids reduce the number of words required to communicate ideas. They stimulate interest, increase attention, promote understanding, and provide experience not obtainable in other ways.

2. Definition. In the broadest sense, training aids include just about anything that assists the instructor in conducting training. For the purposes of this discussion, the items listed below, when used for training purposes, are classified as training aids.

    a. Printed or Duplicated Aids. These include books, manuals, pamphlets, regulations, directives, handouts, and advance sheets.

    b. Graphic Aids. These include pictures, drawings, illustrations, photographs, chalkboards, bulletin boards, easels, magnetic placards, maps, charts, diagrams, and flip charts.

    c. Three-Dimensional Aids. These include objects, globes, models, cutaways, mockups, synthetic trainers, and displays.

    d. Projected Aids. These include slides, transparencies, filmstrips, and motion pictures.

    e. Auditory Aids. These include disk and tape recordings.

3. The Selection and Use of Training Aids. Judgment must be applied in the long-range and day-to-day choice of training aids and in the ways in which they are used. The instructor must assume the responsibility of insuring learning effectiveness and efficiency by selecting or developing training aids which complement the basic instructional strategy chosen to accomplish the training objective. Each training medium has certain advantages and limitations. These factors must be carefully weighed before a final selection is made.

a. <u>Basic Selection Guides</u>. The following general guides should be used in selecting training aids regardless of type:

(1) Select aids which fit the maturity, interest, and abilities of the student group.

(2) Select aids which are most appropriate for the particular learning activity.

(3) Maintain a balance in the types of aids selected.

(4) Select aids which complement, rather than duplicate, other learning resources.

(5) Avoid the over-use of aids. Do not use an aid just because it is available.

(6) The major criterion of selection is: "Will it advance learning; is it needed?" A training aid must actually aid training and not serve as mere "eyewash."

b. <u>Conditions for use in the Classroom</u>. Certain factors and conditions tend to encourage the use of training aids. Among these conditions are the following:

(1) Aids are available in sufficient variety and quantity to permit selectivity.

(2) Technical advice and assistance for the development and use of aids are readily available.

(3) Required equipment is available and in good repair.

(4) The leadtime required for the fabrication, procurement, or purchase of aids is minimal.

(5) Aids are cataloged and stored so as to facilitate use.

B. GUIDES TO THE SELECTION
OF TRAINING AIDS

1. <u>Printed or Duplicated Aids</u>.

a. <u>Definition</u>. Printed or duplicated aids are materials used to support instruction in the form of books, manuals, periodicals, pamphlets, regulations, directives, handouts, or the like.

b. <u>Uses</u>.

(1) To provide advance assignments. Printed aids may be used to provide students with the background information required to participate effectively in classroom learning activities.

(2) To provide reference material. Printed aids may be used as a basis for the preparation of reports or as source material for the solution of a problem.

(3) To provide review and practice material. Printed aids may be used as in-class or out-of-class review or practice materials.

(4) To provide evaluation method. Printed aids may be used as a means of checking on the effectiveness of other learning activities.

c. Advantages.

(1) Effective organization. Printed or duplicated aids can be organized more carefully because they are prepared considerably in advance of use.

(2) General availability. Large quantities of printed materials usable in instruction are readily available from large numbers of military and commercial sources.

(3) Economy. Printed or duplicated aids are relatively inexpensive.

(4) Compactness. The printed word condenses a large volume of material or experiences into a small space.

(5) Ease of reproduction. Printed materials are easily and quickly duplicated in the required quantity.

d. Disadvantages.

(1) Possible unsuitability. Unless printed materials are locally prepared, parts of the material may be unsuitable for local requirements because of the bias of the writing or the amount of detail included.

(2) No provision for individual differences. Printed or duplicated materials cannot be suited to the abilities, interests, or backgrounds of all members of a student group.

(3) Possible misinterpretation. The extent to which the printed word conveys the intended idea depends upon the clarity and comparability of the meanings which writer and reader attach to the terms used.

(4) Nonstandard learning outcomes. The amount of learning derived from printed material is a function of reading speed and comprehension. Differences in these skills within a student group will result in differing amounts of learning as well as in different completion times for any reading or study assignment.

e. Selection Criteria. Printed or duplicated materials selected or produced to support instruction must:

(1) Emphasize content which relates to and is consistent with the training objective.

(2) Be free of bias and ambiguity.

(3) Be presented in an interesting and readable form.

(4) Include, where applicable, aids to the reader in the form of indexes, glossaries, references, questions, or study hints.

2. Graphic Aids. These are materials which communicate facts and ideas through a combination of pictures, drawings, symbols, and words.

a. Incidental Graphics.

(1) Definition. The term incidental graphics refers to the use of a chalkboard or easel for printing, illustrating, or drawing information during or immediately preceding the presentation of instruction.

(2) Uses.

(a) To outline objectives. The chalkboard or easel is a convenient medium for emphasizing the objectives and scope of an instructional block.

(b) To introduce technical terms. The devices offer an easy and effective means of teaching the spelling, pronunciation, and definition of technical terminology.

(c) To provide illustration. The devices provide a simple and convenient means of illustrating processes, objects, or ideas by the use of sketches or line drawings.

(d) To record key points. The devices can be used effectively to record progress and evolution of ideas in problem-solving and to emphasize the key points in a discussion.

(3) Advantages.

(a) Convenience. Almost all classrooms are equipped with chalkboards or easels, well-positioned for easy use by the instructor.

(b) Flexibility. The devices allow freedom in creating materials on-the-spot and permit quick and easy changes or rearrangement of materials.

(4) Disadvantages.

(a) Dependence on skill of the instructor. Although the devices are easy to use, this characteristic often results in careless use and resultant inefficiency in learning.

(b) Possible misinterpretation. The background of the student determines the interpretation he makes of words, symbols, and even drawings.

(c) Lengthy preparation time. Extensive chalkboard illustrations and listings require a great amount of preparation time. Care should be taken to insure lengthy boardwork is prepared before each class begins. The use of other media should be considered.

(5) Criteria. Materials placed on chalkboards or easels must be:

(a) Appropriate for the instructional objectives.

(b) Neatly and clearly drawn or printed so as to be clearly visible or readable to all students.

(c) Accompanied by adequate explanation to avoid misinterpretation.

b. Prepared Graphics.

(1) Definition. Prepared graphics are printed, embossed, or photographic materials which communicate ideas clearly and forcibly in condensed form through a combination of pictures, drawings, symbols, and words. They include flat pictures, embossograph placards, charts, maps, graphs, and diagrams.

(2) Uses.

(a) To introduce topics. Graphics can be used to introduce new topics in such a way as to capture student attention.

(b) To stimulate interest. Well constructed graphics add interest to a lecture or discussion, and stimulates student questions.

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(c) To provide illustration. Graphics provide an effective means of illustrating objects, procedures, or ideas presented in lectures or demonstrations.

(d) To effect emphasis. Carefully selected graphics focus attention on the critical or important elements in a presentation.

(e) To summarize topics. Graphics are effective summarizing devices.

(3) Advantages.

(a) Simplicity. Quantitative data and complex relationships can be presented simply and clearly by means of graphics.

(b) Interest value. Graphics are inherently more interesting than verbal descriptions or numerical tabulations.

(c) Economy. Graphics are relatively inexpensive to procure or produce.

(d) Flexibility. Graphics are easily adaptable to many learning situations.

(4) Disadvantages.

(a) Abstract. Graphics are principally abstract and symbolic. They therefore require supplementation by other methods or media.

(b) Lack detail. Graphics must focus on key points and dispense with detail. In some situations this loss of detail may be critically important.

(c) Two-dimensional. If depth is important to the learning, graphics may be completely unsuitable.

(d) "Still" problem. Graphics are usually motionless. If motion is essential to learning, graphics may be inappropriate.

(5) Criteria. Graphics used in instruction must:

(a) Be large enough so that all students can see them clearly.

(b) Be pleasing in composition and arrangement.

(c) Be accurate and truthful.

(d) Be sharp and clear so that all details are easily distinguishable.

(e) Avoid too much detail or an insufficiency of detail.

(f) Use color judiciously.

(g) Employ easily identifiable symbols.

(h) Include only essential data.

3. Three-Dimensional (3-D) Aids.

a. Definition. A 3-D aid may be any one of the following:

(1) Objects. These are the real thing, such as equipment, components, or tools removed as units from their normal setting.

(2) Models or cutaways. These are recognizable 3-D representations of real things.

(3) Mockups. These are imitations of the real thing but do not necessarily involve similarity of appearance.

b. Uses.

(1) To provide illustration. Instead of merely talking about an object, or showing a picture or drawing of it, the actual object or a model is often a more effective illustration.

(2) To teach operation or functioning. The use of equipment, tools, or instruments and processes is often most effectively taught by using the actual objects, models, cutaways, or mockups.

c. Advantages.

(1) Realism. Three-dimensional aids give depth and substance to the item under study and thereby enhance learning.

(2) Simplicity. Nonessential elements of the item can be omitted or removed from the aid so that basic elements can be more easily observed.

(3) Adaptability. Models, cutaways, and mockups can provide interior views of objects ordinarily covered or otherwise invisible. In addition, large objects can be reduced in size and small objects can be enlarged to convenient size for study and observation.

(4) Emphasis. Color and texture can be added to 3-D aids to accent or emphasize important parts or features.

d. Disadvantages.

(1) Expensiveness. Models, cutaways, and mockups are expensive to construct and maintain.

(2) Possible misinterpretation. Problems of clarity of communication, misunderstanding of size, function, or complexity may be created by 3-D aids. Such misunderstandings are difficult to correct.

(3) Difficult storage. Three-dimensional aids are difficult to catalog and require a considerable amount of storage space.

e. Criteria. Three-dimensional aids used in instruction must:

(1) Be accurate and true-to-life.

(2) Be large enough to be clearly visible to the entire student group.

(3) Be as simple as possible.

(4) Be durable.

4. Displays and Exhibits.

a. Definition. A display or exhibit is a collection of graphic, photographic, or 3-D aids grouped and displayed to accomplish a specific instructional purpose.

b. Uses.

(1) To introduce a subject. A well-designed exhibit or display is an excellent means of stimulating interest and student motivation.

(2) To summarize a subject. An exhibit or display can be an effective means of providing a summary for a specific instructional block.

c. Advantages.

(1) Interest value. Well-designed displays and exhibits are inherently more interesting than verbal descriptions.

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(2) Flexibility. Exhibits and displays lend themselves to almost any type of content.

    d. Disadvantages.

      (1) Time consumption. The design and production of worthwhile exhibits and displays is time consuming.

      (2) Space allocation. Adequate space in a desirable location must be set aside for the exhibit or display.

      (3) Misinterpretation. Students may not know what to look for in an exhibit or display, and this problem, when added to the fact that the items have been taken out of their real-life settings, often results in misunderstandings that are difficult to correct.

      (4) Inconvenience. Some things cannot be brought into the classroom or training area because of size, safety considerations, or expense.

    e. Criteria. An exhibit to be effective must:

      (1) Have a single central theme.

      (2) Occupy a place of prominence.

      (3) Be left up only long enough to achieve its purpose.

      (4) Be attractively arranged, well lighted, and clearly labelled.

5. Projected Aids. These are slides, transparencies, filmstrips, and motion pictures that require a projector and screen for viewing by the student.

    a. Slides, Transparencies, and Filmstrips.

      (1) Definition. Slides are single transparent pictures or drawings that can be projected onto a screen. They are usually made of photographic film, although sometimes they are etched on glass or plastic. Transparencies are large slides, usually 7" x 10" or 10" x 10" in size. Filmstrips consist of a fixed series of individual slides placed on a single strip of 35mm film.

      (2) Uses.

        (a) To introduce. Slides, transparencies, or filmstrips can be used to present an introduction and overview of a subject or a process.

        (b) To provide illustration. The devices offer a simple and convenient means of illustrating objects, processes, or ideas.

        (c) To summarize. Filmstrips, transparencies, and slides provide an effective means of summarizing and reviewing content previously taught by other means.

      (3) Advantages.

        (a) Convenience. Slides, transparencies, and filmstrips can picture objects, events, and ideas that are far away in time or space, enlarge difficult to see objects, and stop action.

        (b) Centering of attention. A darkened or semi-darkened room and a brilliant screen focuses the attention of the students on the instructional materials.

        (c) Realism. Actual photographs lend realism to instruction only slightly less effectively than first-hand experience.

(d) Instructor-paced. With slides, transparencies, and filmstrips the illustration can be left on the screen for any length of time for study and discussion.

(e) Ease of operation. Projection equipment for slides, transparencies, and filmstrips is easy to operate.

(f) Economy. Films, transparencies, and film-strips are reasonable in cost to purchase or produce.

(g) Ease of storage. Visuals of this type occupy little storage space and are easily cataloged.

(h) Flexibility. Projected visuals are suited for color as well as black and white and they can be used in a variety of learning situations.

(4) Disadvantages.

(a) Fixed or preplanned sequence. Sometimes the set sequence of a filmstrip or the preplanned sequence of a series of slides is inappropriate. In the case of the filmstrips, it is impossible to change the order of frames.

(b) Equipment requirement. Equipment in good repair may not always be readily available and sometimes the equipment breaks down.

(c) Lack of motion. A still medium cannot portray motion effectively. If motion is essential, the slides, transparency, or filmstrip may be inadequate.

(5) Criteria. Slides, transparencies, or filmstrips used in instruction must:

(a) Fit the training objective.

(b) Avoid the inclusion of extraneous material.

(c) Be well-designed.

(d) Be accurate and true-to-life.

(e) Be accompanied by appropriate commentary.

b. Motion Pictures.

(1) Definition. Motion pictures include black and white, color, silent, or sound 8mm or 16mm film directly photographed or pro-duced by kinescope recording.

(2) Uses.

(a) To introduce a topic. Motion pictures can effec-tively be used to present an introduction and overview of a subject.

(b) To teach difficult-to-present material. Motion pictures are an effective means of explaining processes not available for direct observation because of time, distance, or safety. They also offer a means of presenting complex materials, of slowing down or speed-ing up processes, and of showing applications.

(c) To summarize a presentation. Motion pictures can provide an effective means of summarizing content presented pre-viously by other means.

(3) Advantages.

(a) Realism. Motion pictures can bring remote events into the classroom without loss of realism.

(b) Time savings. Films can substitute for field trips thereby saving time. The condensed nature of a film production also results in time savings.

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(c) Teaching effectiveness. The use of sound and motion increases interest, focuses attention on critical elements and enhances learning.

(4) Disadvantages.

(a) Student passiveness. With motion pictures students play a passive role. Because of darkened room, note taking is kept to a minimum.

(b) Require mechanical aid. Motion picture projectors, while not difficult to operate, are not always available and they are subject to mechanical or electrical failure.

(c) Require supplemental methods. Students must be carefully prepared for film viewing and some sort of followup is needed to insure learning.

(d) Open to misinterpretation. Students view films in the light of their own experiences. If provisions are not made for followup, misunderstanding may be the result.

(5) Criteria. Motion pictures used for instruction must:

(a) Fit the specific instructional purpose.

(b) Be preceded by specific preparation for viewing the film.

(c) Be followed by appropriate learning activities.

(d) Be current.

6. Auditory Aids.

a. Definition. Auditory aids include disk and tape recording and their associated equipment.

b. Uses.

(1) To improve speech. Tape recorders can be used to record, evaluate, and improve speech habits, diction, voice, intonation, enunciation, and general speech patterns.

(2) To give foreign language instruction. Tape recorders and recordings are an effective means of building foreign language speech and listening skills.

(3) To provide change of pace. Recordings can be used as a change of pace from one voice to another.

c. Advantages.

(1) Realism. Actual sounds can be reproduced with sufficient fidelity to foster the development of high level discrimination skills.

(2) Operational ease. Recorders are easy to operate.

(3) Inexpensiveness. Tape recorders are relatively inexpensive. The reusability of tapes further reduces costs.

(4) Flexibility. Tapes can be used in a variety of learning situations, singly or in combination with other media, and by individuals as well as groups. Contents of tapes are easily changed to suit the instructional objective.

d. Disadvantages.

(1) Equipment requirement. Since recorders are necessary, they must be in good working order at all times. Equipment breakdowns, however, are quite common.

(2) Possible misunderstanding. Particularly when used by individuals, recordings can easily be misunderstood or misinterpreted, leading to wrong concepts or the practice of errors.

e. Criteria. Recordings used for instruction must:

(1) Make a definite contribution to the achievement of the training objective.

(2) Be true-to-life.

C. PROCEDURES

1. Preliminary Analysis.

a. Enter on Form IAT 72 (at annex A to this chapter) LP title, number, number of hours, POI title and number, and recommended instructional strategy.[1]

b. Copy the performance objective from the POI in the space provided. Study the performance objective until you have clearly in mind what it is that the student must be able to do, the conditions under which he must do it, and the cirterion of successful performance. Keep these factors before you as you select your training aids.

c. Analyze the student group scheduled for this block of instruction in terms of previous instruction, related training and experience, acquired skills, vocabulary, level of maturity, and instruction that will follow. Keep these factors in mind when you select a training aid.

d. Consider the facilities which will be used to conduct instruction in terms of class size, time available for instruction, room characteristics, and equipment available.

2. Tentative Selection.

a. Carefully review each part of the outline of content to be taught and make appropriate entries in column 1 of Form IAT 72. These entries should:

(1) Indicate the purpose and coverage of the introduction.

(2) List the major teaching points in abbreviated form.

(3) Indicate the main point/s of the summary of the lesson.

---

[1]See chapter 13 for definition.

b. For the introduction, teaching points, and summary, if appropriate, select a "type" aid which will supplement, rather than supplant, the method or strategy being used, and enter the name of the type aid in column 2 of Form IAT 72; e.g., transparency, motion picture, model, handout, etc. Before making your decision, check carefully the uses, advantages, and disadvantages of each type aid detailed in section B of this chapter.

3. Survey Available Resources.

a. If a check of local resources reveals that an aid of the type desired is available, get the aid and study it with these questions in mind:

(1) Does it meet the objectives?

(2) Does it support the strategy?

(3) Is it current and accurate?

(4) Does it avoid extraneous detail?

(5) Is it well-designed?

b. If the answer to each of these questions is "yes," place a check mark in column 4 of Form IAT 72 for each part of the outline for which a training aid is "on-hand."

c. If the answer to any one of the questions is "no," arrange with Training Aids Division to up-date or redesign the fabricated type aid.

d. If no suitable fabricated type aid is available, consult with Training Aids Division to determine whether a suitable aid can be fabricated. Get answers to these questions:

(1) Can the teaching point be adequately visualized?

(2) Can the aid be made locally?

(3) Is sufficient leadtime available for fabrication of the aid?

e. If the answer to each question is "yes," place a check mark in column 4 of Form IAT 72 and prepare a rough sketch or sample of the required training aid.

f. Route one copy of Form IAT 72, together with one copy of each existing printed, graphic, or projected aid (other than motion picture film or filmstrip) or the rough drafts or sketches of aids to be procured, duplicated, purchased, or fabricated, as follows:

(1) Chief, Division for check of technical accuracy.

(2) Director, Department for check of adequacy.

(3) Director, Office of Training Literature for determination of editorial and doctrinal correctness.

g. Upon receipt of approved Form IAT 72, prepare a Training Aids Work Request (DA Form 1357) in triplicate for each aid to be fabricated and forward to Chief, Training Aids Division. Allow sufficient leadtime for fabrication of the aid.

h. Requests for Military and federal publications to be used as training aids will be submitted through channels normally used for requisitioning these publications. DA Form 17, Requisition for Publications and Blank Forms, will be used for the requisitioning. Allow sufficient leadtime for procurement of the aids.

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i. Requests for books or periodicals to be used as training aids will be submitted through channels normally used for requisitioning these publications. DD Form 1150, Request for Issue or Turn-In, will be used for the requisitioning. Allow sufficient leadtime for purchase of the aids.

j. Requests for reproduction of materials to be used as training aids will be submitted through channels normally used for requesting duplication. DD Form 844, Requisition for Local Duplicating Service, will be used for requesting the service. Allow sufficient leadtime for reproduction of the aid.

D. REFERENCES

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2. De Kieffer, Robert and Lee W. Cochran, Manual of Audio-Visual Techniques, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1962.

3. FM 21-6, chapter 8, May 1954.

4. Thomas, R. Murray and Sherwin G. Swartout, Integrated Teaching Materials, David McKay Company, Inc., New York, 1963.

5. Wittich, Walter A. and Charles F. Schuller, Audio-Visual Materials, Harper and Brothers, New York, 1957.

6. Brown, James W. and Kenneth D. Norberg, Administering Educational Media, McGraw-Hill Book Company, New York, 1965.

7. Erickson, Charlton W.H., Fundamentals of Teaching with Audio-Visual Technology, The MacMillan Company, New York, 1964.

Annex A

TRAINING AIDS SELECTION WORKSHEET

LP TITLE _____   POI TITLE _____

LP No. _____   POI No. _____

INSTR STRATEGY _____

OBJECTIVE :

CONTENT OUTLINE	APPLICABLE TYPE AIDS	ON-HAND	REQUIRES FABRICATION/ REQUISITION
1	2	3	4
A. INTRODUCTION TO LESSON			
B. BODY OF LESSON (Enter abbreviated list of major teaching points.)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
C. SUMMARY			

IAT 72

CHAPTER 9

DETERMINING EQUIPMENT REQUIREMENTS

A. INTRODUCTION

1. <u>Purpose</u>. Equipment of several types is required to conduct training programs designed to develop job skills. If instruction is to be maximally effective, the right type of equipment in the right quantities must be available when required. Equipment is expensive. It also requires a considerable amount of leadtime for procurement and installation. In addition, plant support (space, power, and environmental control) requirements which arise from the use of equipment, require extensive leadtime. For these reasons, the precise quantity and kind of equipment needed to support instruction must be determined well in advance of the time it is to be used. As a guideline, at the present time equipment must be determined accurately 3 to 5 years in advance if usable facilities are to be available at the time the instruction begins. Careful planning, the application of standards, and close coordination between the USASATC&S and HQ, USASA, and between academic elements and the Office of Logistics are essential to the timely and accurate determination of equipment requirements. The purpose of this chapter is to establish standards and procedures for determining the types and quantities of equipment required to support training.

2. <u>Categories of Equipment</u>. Several categories of equipment are used in training. The first type consists of standard classroom furniture, such as chairs, desks, tables, and laboratory benches. Standard training aids equipment, such as projectors, screens, tape recorders, chalkboards, and easels comprise the second category. The third category includes specialized training equipment associated with training in a particular MOS. Typewriters, radio receivers, recorders, test equipment, computers, models or mockups of these items, special laboratory benches, and communication, noncommunication, ACOUSTINT, or optical signal simulators are examples of equipment in this category. The present chapter deals exclusively with the third category.

B. BASIC DATA REQUIREMENTS

1. <u>Five Critical Questions</u>. Before a decision is made regarding the types and quantities of equipment to be procured for training, five critical questions must be answered.

    a. What are the objectives of the training?

    b. Should training on a specific item of equipment or position be provided?

c. What MOS should receive the training?

d. How many technicians should be trained on the equipment per year?

e. Where should the training be conducted?

2. **Types of Data Needed**. To provide adequate answers to the foregoing questions, certain data must be collected and carefully analyzed. These data are as follows:

a. **Current Equipment**. Information regarding equipment currently authorized and in use is of first priority. Specifically, the following data must be collected:

(1) By type, equipment installed and in use in operating units and its location by geographical area and "type unit."

(2) The purpose of the equipment and the type of mission it is designed to support.

(3) The MOS of personnel operating and repairing the equipment.

(4) The number of positions of each type installed worldwide.

b. **Future Equipment**. Because equipment required to support training must be included in the USASA Command Program (Combined Cryptologic Program (CCP), Combined Intelligence Program (CIP), and Force Structure Package III Program), the types and quantities of needed equipment must be determined 5 years in advance of the date of use. This means that forecasts of equipment must be obtained. These projections must include the following information:

(1) Equipment by type and its location by geographical area and "type unit."

(2) The purpose of the equipment and the type of mission it is designed to support.

(3) The MOS which will operate and repair the equipment.

(4) The number of positions to be installed and manned.

c. **Availability of Equipment**. For planning purposes it is essential that information be obtained pertaining to the availability of current and future equipment and positions for training. These data, however, should not be a limiting factor to planning instruction until it is determined that what is currently available, or programmed to be available at the time the instruction is to begin, cannot be changed to conform with the amount needed for optimum instruction.

d. **Equipment Costs**. Some items of highly complex equipment are so expensive that training positions at the School cannot be justified. This is particularly true in cases where a relatively small number of students is to be trained. Section D of this chapter establishes cost-per-student limits for equipment positions. To apply these standards, information pertaining to equipment costs must be obtained.

e. **Student Input**. To apply the cost-per-student standards referred to in item d above requires accurate forecasts of student input to specific courses. In addition, the number of items of equipment or positions required to conduct training is in part a function of the number of students to be trained concurrently. Therefore, planning

for equipment procurement must be based upon reasonably accurate student input forecasts up to 5 years in advance. Specifically, the following information is required annually for planning purposes:

      (1) By quarters, the number of graduates required in each MOS.

      (2) The number of students to be assigned to each class.

      (3) The number of classes that will be in session concurrently.

    3. Sources of Data. Some of the data required to determine equipment requirements is available locally; however, much important basic information must be obtained from other sources. This means that effective internal coordination and liaison with higher headquarters and other agencies must be established. The sources of these data are as follows:

      a. Current Equipment Allocations and Usage.

        (1) Headquarters, USASA: DCSLOG.

        (2) Headquarters, USASATC&S: Office of Logistics.

        (3) Job analysis schedules produced by USASA Command Job Analysis Teams.

      b. Future Equipment.

        (1) Headquarters, USASA: Combat Developments Activity (CDA), DCSLOG, and DCSFOR.

        (2) USASA Materiel Support Command (USASAMSC).

        (3) National Security Agency (NSA).

        (4) Headquarters, USASATC&S: Office of Training Literature.

      c. Equipment Availability and Costs.

        (1) Headquarters, USASA: DCSLOG.

        (2) Headquarters, USASATC&S: Office of Logistics.

      d. Student Input.

        (1) Headquarters, USASA: DCSPER and DCSFOR.

        (2) Headquarters, USASATC&S: Office of Plans and Programs.

        (3) Headquarters, USASATC&S: Scheduling Branch, Office of Academic Operations.

        (4) Headquarters, USASATC&S: Office of Personnel and Administration.

C. SELECTING TRAINING EQUIPMENT

    1. Primary Factors to Consider. Once a decision has been made to conduct training locally on specific equipment or positions, the types and quantities of equipment required must be determined. Several factors must be weighed carefully before Position Deployment Schedules are changed and requisitions for equipment are submitted. The following factors, therefore, must be considered.

      a. Training Objectives. The fundamental consideration in the selection of equipment is the objective of the training. Where the objective of the instruction is to teach nomenclature or simple identification, no actual equipment may be required; a training aid may suffice.

However, if the objective is to develop operator, maintenance, or repair skills, equipment of some type will be required. Training equipment may be installed in two types of configurations depending upon the objectives of the training.

(1) Field configuration. In cases where job performances must be developed under conditions identical to the field environment, actual equipment, in the configuration used in field units, must be used for training. For example, if a technician must be able to operate equipment in the limited space of an Armored Personnel Carrier (APC), a fully equipped APC must be available for training.

(2) Training configurations.

(a) Expanded configuration. Training is very often facilitated when a field configuration is installed in a manner which permits either easier access to components or simultaneous training of several students. In this case, field configurations are modified and components may be disarrayed for easy observation, access, examination, etc.

(b) Fragmented configuration. Where training is given only on the main components of a field configuration, a training position may consist of the major components, complete with interconnecting cables, but without ancillary equipment such as antennas and generators.

(3) Teaching Systems equipment. This is equipment used to present instructional material to the student; i.e., it is not used as a training aid. Examples of this type of equipment are simulators, EDEX teaching system, simplex, and closed-circuit television.

b. Instructional Strategy. The instructional strategy used to achieve the training objective has a direct bearing on the types and amounts of equipment needed. Different instructional strategies may require different types of equipment. But, regardless of which strategy is used, the basic purpose of the equipment is to support the objectives. Equipment that is too simple or too sophisticated will not support the instruction. Individual performance may require more equipment than team performance. Both performance strategies require more equipment than the demonstration method.

c. Student Population. The number of students in a class and the number of classes taught concurrently determine, in part, the number of pieces of equipment required to support the instruction. The Detailed Schedule of Classes provides the student input data needed to determine the amount of equipment required.

2. Limiting Factors. Section C1 identifies the basic considerations used in determining the type and quantity of training equipment required. Standards based exclusively on these factors would result in an ideal training situation. Unfortunately, compromises may often be necessary because of certain limiting factors. These factors are as follows:

a. Training Area and Facilities. Limitations on the type and quantity of equipment are often imposed by shortfalls in providing space, power, and air-conditioning requirements. These shortfalls result from inadequate leadtime and lack of funds. These factors may restrict equipment in terms of kind, number, and configurations.

b. Safety Requirements. Special consideration must often be given to safety requirements in determining both the kind of equipment, the number of positions, and their physical layout or arrangement. These factors are often crucial in determining student-equipment ratios.

c. Security Requirements. Classified equipment requires special handling and security precautions. There are limits imposed on the location of such equipment; that is, classified equipment that must be installed in secure areas.

d. Availability. Often there are limits on the number of items of equipment available. Sometimes, requirements of operating units must be met before equipment positions can be made available for training. This dictates higher-than-desirable student-equipment ratios, extra training shifts (night classes), changes in scheduling, rotation of students, simulation of equipment by the use of models and mockups, or the use of older models of the equipment.

e. Costs. The investment in equipment represents a very large part of the total training budget. As noted earlier, some items of equipment are so expensive that procurement of positions in the number indicated by the standards may be impossible to justify. It may sometimes be necessary to settle for fewer pieces of equipment than the ideal student-equipment ratio would normally indicate in order to keep costs at a reasonable level.

D. STANDARDS FOR DETERMINING
TRAINING EQUIPMENT REQUIREMENTS

1. Knockout Standards. There are four factors which will determine whether or not training will be conducted on an item of equipment at the School. These are cost-per-student, universality of equipment allocations, student input, and equipment utilization. If any of these factors is below the standard, training on the equipment must be conducted elsewhere.

a. Cost per Student. Because the cost of equipment may exceed an amount which can be justified, maximum cost standards must be established and applied. This means that when costs exceed the maximum, training on the equipment will ordinarily be conducted at a location other than the School (by the manufacturer, at NSA, or at the operating unit on the job), unless the local conduct of such training is directed by higher headquarters. The cost-per-student index has been selected because the procurement of expensive equipment may be justified by the number of students to be trained annually. As an interim standard, a maximum cost per student is established at $5,000. This index is

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computed by dividing the actual cost of the equipment or position, or
the cost of fabricating a model, mockup, or simulator, by the annual
student input to courses in which the training equipment will be used.

b. Universality of Equipment Allocations. It would be
extravagant in terms of both time and equipment costs to train all per-
sonnel of a specific MOS to operate, maintain, or repair sophisticated
or costly equipment that is unique to a particular unit or location.
For this reason, an arbitrary cutoff of 30 percent is hereby established
as an interim standard to be applied in determining whether a specific
item of equipment is to be procured for School training. This means
that for the MOS concerned, at least 30 percent of the units to which
the man might be assigned must have the equipment installed. A smaller
percentage will indicate that the training must be conducted by the
manufacturer, at NSA, or on the job at the unit.

c. Student Input. Because student input is a function of
equipment cost per student, and because even relatively low equipment
costs cannot be justified for small trainee groups, standards based on
student input alone must be set. Therefore, a minimum of 50 students
per year is hereby established as an interim standard to be applied in
determining whether highly specialized equipment should be procured.

d. Equipment Utilization. Training equipment may meet the
standards pertaining to cost per student, unit allocation, and student
input and still represent an unjustifiable cost because of extremely
limited instructional utilization. Therefore, as an interim standard,
equipment procured for training must have a predicted annual average
utilization of 80 man-hours per student enrolled in courses using the
equipment for instructional purposes.

2. Selection Standards. Once it has been determined that train-
ing on a specific item of equipment at the School can be justified, the
next consideration is to determine types of equipment required. As
noted earlier, training effectiveness must be achieved. This can be
attained only by selecting equipment which complements the training
objectives and the instructional strategy. The following general stand-
ards should be used in selecting equipment:

a. Appropriate for the Learning Activity. The equipment
used for training must be appropriate for the particular learning
activity. For example, if the objective of the learning activity is to
build skill in operating a piece of equipment, the actual equipment,
rather than a model or mockup should be used.

b. Complements Other Learning Resources. The equipment must
complement rather than duplicate other learning resources. For example,
a mockup of an equipment position should not be fabricated if opera-
tional or training positions are available in sufficient numbers to meet
requirements.

c. Currently in Use in the Field. Equipment currently in use
in the field units must be selected. With few exceptions, equipment and
positions which are no longer used in operating units should not be used
for training. The exceptions include cases where only minor modifica-
tions have been made to equipment which would not pose problems of trans-
fer of training.

d. **Realistic**. If simplified equipment, simulators, mockups, or models are used, they must be realistic. For example, if a mockup of a piece of complex and expensive equipment is used, the layout and configuration of the mockup, control panels, and the like must be exact representations of the real item.

e. **Essential to Training**. Only that equipment which is essential to the conduct of proper training, and only in the amounts required to handle the student input efficiently, should be procured. In cases where a model or mockup will do the training job, and the cost is less than that of the actual equipment (both for fabrication and maintenance), the substitute should be used.

3. **Quantity Standards** (student-equipment ratios). The number of items of equipment required to conduct training efficiently can be substantially reduced by the rotation of groups and classes and by careful scheduling of classes. For this reason, the standards established in the subparagraphs that follow are maximums.

a. **Lecture/Demonstration**. For a lecture or demonstration involving only equipment recognition, nomenclature, and technical characteristics, one item of equipment or position to be described or demonstrated per class in session concurrently is the maximum. (Note: the possibility of using some type of training aid should be carefully studied before the actual equipment or a mockup is requisitioned.)

b. **Demonstration**. For demonstration of the operation of equipment, one item of the equipment or one position per class in session concurrently is the maximum.

c. **Individual Performance**. For performance of individual skills, one item of equipment or one position per student receiving instruction concurrently is the maximum.

d. **Team Performance**. For performance of team skills, one item of equipment or position per team receiving the instruction concurrently is the maximum.

E. PROCEDURES

1. **Current Requirements**. For MOS which have been job analyzed, the following procedures will be used.

a. **Types of Equipment Required**.

(1) Chief, Evaluation Unit will apply the standards found in section C, paragraph 1 to determine the specific equipment or positions on which instruction will be provided at the USASATC&S. These requirements will be reflected in the Performance Objective Workcards forwarded to the responsible academic elements following the completion of job analysis and the selection and writing of performance objectives.

(2) Upon receipt of the Performance Objective Workcards, the responsible academic element will select and sequence course content (chapter 6) and select instructional strategies and training aids (chapters 7 and 8).

(3) Next, the responsible academic element will check the Performance Objective Workcards to determine exactly what type of equipment is to be used in training.

(4) Then, the objectives, strategy, and equipment listed on the Performance Objective Workcard will be matched against the selection standards defined in section D, paragraph 2a through e. This analysis will culminate in the selection of a "type" configuration for the equipment. (See section C, paragraph 1a.)

(5) The responsible academic element will then submit a request to Director of Logistics for acquisition and installation of the equipment. This request must include all the information available on the need for equipment so that the Director of Logistics can justify the new requirement to Headquarters, USASA.

(6) Upon receipt of the request, the following actions will be taken by the Director of Logistics.

(a) Review the requirement to insure that the request is logically presented and complete.

(b) Conduct a technical review of the configurations requested to insure that they will meet the instruction mission requirement and that they are technically feasible.

(c) Review the equipment list to insure that it is complete and correct. Convert equipment list into a programmed bill of material (BOM). A BOM is devised:

$\underline{1}$. By a project officer in DCSLOG, HQ, USASA.

$\underline{2}$. By a change to a current ASA BOM: proposed by instructional element and processed by Director of Logistics, USASATC&S.

$\underline{3}$. By making a new BOM based on proposal of an instructional element and processed by Director of Logistics, USASATC&S.

(d) Assign a position/facility designation, if applicable.

(e) Prepare an Installation Bulletin for the proposed configuration, if applicable.

(f) Prepare a command letter to HQ, USASA requesting changes to Position Deployment Schedule, BOM, and TA 32-1. An Installation Bulletin will also be requested, if applicable.

(g) Subsequent to the receipt of approval from HQ, USASA, the Director of Logistics will provide appropriate instructions through the Director of Instruction and department directors to chief instructional divisions, for requisitioning of equipment.

b. Quantity of Equipment. To determine the quantity of equipment required to support a course of instruction, a detailed analysis of the POI and its component lesson plans must be made. A sample analysis is attached as annex A, p 9-11. The procedure is as follows:

(1) In sequence, identify each lesson plan and criterion test requiring equipment and enter the lesson plan or test number in column 1 of annex A.

(2) Enter the time allocation for each lesson plan and test entry in column 2 of annex A.

(3) In column 3, enter the instructional strategy, including criterion tests, involving the use of equipment.

(4) Using the standards defined in section D2 above, enter in column 4 the number of items (or positions) and the military designations of each item of equipment required.

(5) From the Detailed Schedule of Classes determine the number of classes that will be in session concurrently.

(6) Using these data and the analysis found at annex A, determine the total number of items of equipment of each type required. With complex course schedules, the use of equipment and space must be programmed graphically to simplify the process of determining the number of items or positions required. Annex B provides a sample graphic program. Annex C shows how the total equipment requirements are computed for MOS 000 under the conditions defined in annexes A and B.

c. Compromises. Sometimes it will be impossible to achieve the ideal in terms of type of equipment, configuration, or quantity. Lack of space, power, or other facilities and unprogrammed increases in student input may dictate an arrangement which is not the ideal. In such instances, the director, responsible academic department will identify all alternatives, such as increased student/equipment ratios, shift scheduling, rotation of students, or use of mockups, and select the most advantageous alternative.

2. Future Requirements.
a. Director, Office of Training Literature will establish and maintain liaison with NSA, HQ, USASA Combat Developments Agency, DCSLOG, DCSFOR, and the USASA Materiel Support Command to obtain forecasts relating to equipment changes. Quarterly reports will be forwarded to the Assistant Commandant with information copies to Chief, Evaluation Unit, Technical Consultant, Director of Instruction, and the Director of Logistics. These reports will describe projected changes in equipment and their possible impact on MOS producing courses. The factors described in section C, paragraphs 2b, c, and d apply.

b. Director of Logistics will also maintain liaison with DCSLOG, HQ, USASA to obtain equipment forecasts and submit reports as required to the Assistant Commandant with information copies to Director, Office of Plans and Programs, Director, Office of Training Literature, Chief, Evaluation Unit, Technical Consultant, and the Director of Instruction.

c. Annually, during the month of September, Director Office of Plans and Programs will obtain from DCSPERS and DCSFOR, HQ, USASA forecasts of student inputs for each MOS course for the succeeding 5-year period. These forecasts will be forwarded through the Assistant Commandant to Chief, Evaluation Unit, the Director of Instruction, and

each department director. At this time, a Detailed Schedule of Classes for the next fiscal year will be developed, published, and distributed by the Office of Academic Affairs.

3. Effecting Changes to Position Schedules.

a. Within 10 days of receipt of the USASA Position Deployment Schedules (received from HQ, USASA 3 to 6 months prior to each new fiscal year), the Director of Logistics will forward copies of the Position Deployment Schedules to the Director of Instruction and department directors.

b. Within 10 days of receipt of the new Position Deployment Schedules or changes thereto, the Director of Logistics will forward programmed requirements spread sheets to the divisions concerned.

c. Within 10 days of receipt of the requirements spread sheet the Division Chief will:

(1) Submit requests for new equipment required during the present fiscal year, within the limits of funds available. If funds are not available, unfinanced requirements will be reported to the Comptroller, through the Director of Logistics.

(2) Report equipment rendered excess as a result of reduction in programmed requirements, in accordance with section B of this chapter.

d. The Director of Logistics will take action to obtain authorization for additional equipment required due to increases in the position schedules.

e. Department Directors will review their areas of responsibility to insure that the current Position Deployment Schedule is adequate to accomplish their assigned instructional mission.

f. Budget planning for new fiscal years must include funds for new equipment required by the Position Deployment Schedules for that period. Bills of materials of equipment and components contained in the positions and facilities are published by HQ, USASA. Copies are obtainable from the Director of Logistics.

Annex A

SAMPLE ANALYSIS

Sequential Listing of Equipment Requirements Per Class

LP/Test No.	Time Allocation	Instructional Strategy	Requirements
1	2	3	4
EA 0001	35	L	One 10-man classroom.
EA 0103	7	LD	One 10-man classroom and 1 ea AN/GSQ-88, AN/GSQ-77, and AN/MSC-99.
EQ 0104	28	PE	One room adequate to install 3 ea AN/GSQ-88, 3 ea AN/GSQ-77, and 2 ea AN/MSC-99. (See note 1.)
EA 0109	7	GPE	Uses EA 0104 equipment.
EA 0111	14	LD	One 10-man classroom and 1 mockup ea of control panels for tactical positions ABC-13, DEFG4, and MNR-37.
EA 0113	14	LD	One 10-man classroom and 1 ea AT-904, AT-903, and 5kw Gen.
EA 0123	70	FP	Required fld tng on 2 ea ABC-13, 2 ea DEFG-4, and 1 ea MNR-37. (See note 2.)
EA 0125	14	PE	Demo equipment used in phases 2 and 5 respectively on each morning of phase 8A.
CT 5000	7	Test	One 10-man classroom.
EA 0126	3	PE	One ea ABC-13, DEFG-4, and MNR-37 classroom.

Note 1: In LP EA 0104, the AN/GSQ-88 is required for 50 per
cent of the instruction; the AN/GSQ-77 is needed for
33 per cent of the instruction; and the AN/MSC-99 is
required for 17 per cent of the instruction. These
figures are estimates of the time needed to complete
each PE. If this equipment were taught in separate
phases, the requirement would increase to 5 each.
The determination of whether groups of equipment may
be taught together depends on whether a particular
sequence of instruction for the items applies.

Note 2: The three mobile positions used in the Field Problem
are used in conjunction with each other. Two men
operate each position; therefore, five positions are
required. During the 70-hour PE the students will
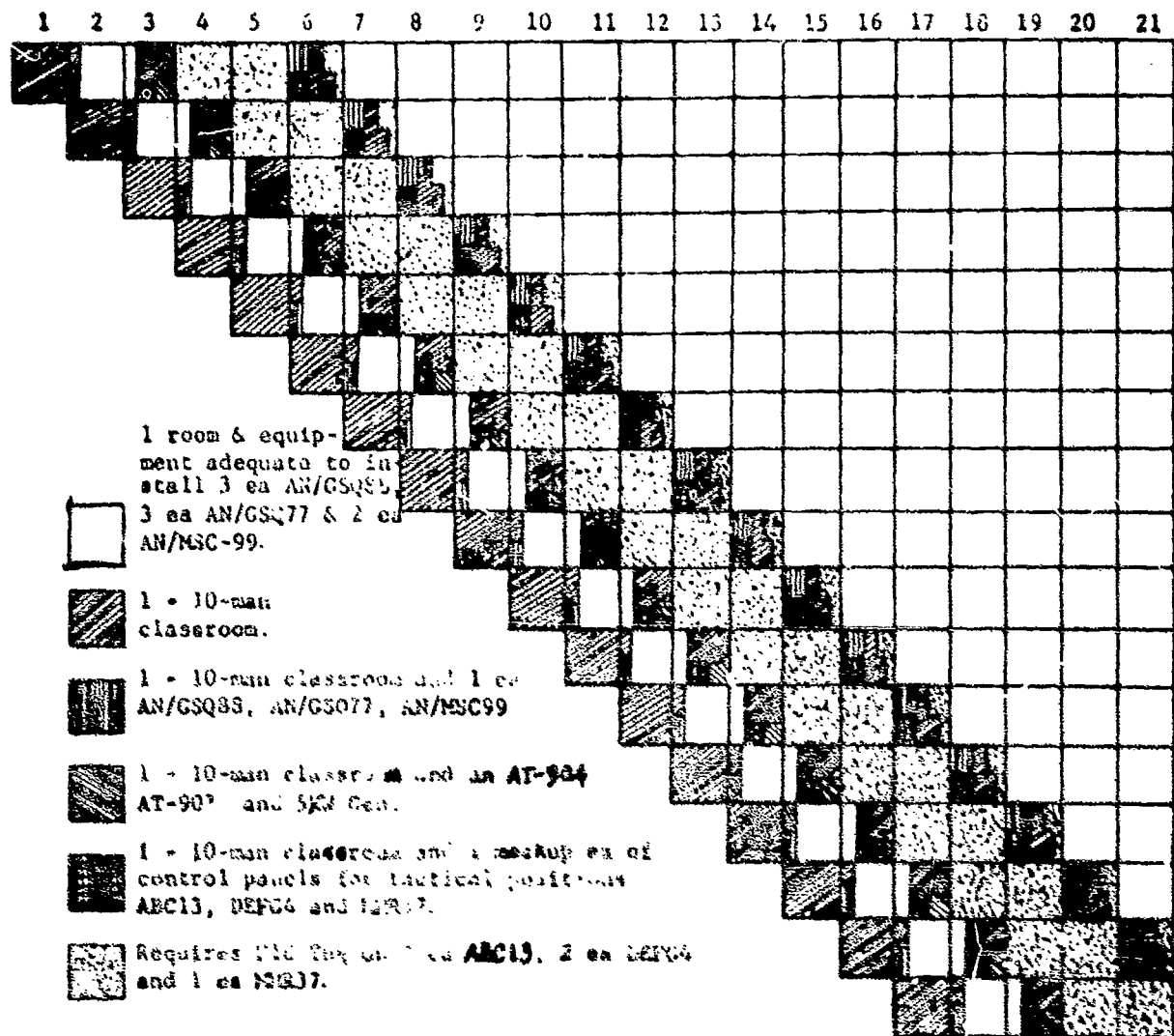operate all of the positions by rotation.

SAMPLE GRAPHIC PROGRAM

CLASS STARTS 3 JAN 19A

CLASS SIZE: 10 STUDENTS

CLASS LENGTH: 6 WEEKS

CLASS INPUT CYCLE: EACH WEEK ONE 10-MAN CLASS

CLASS WEEK

1 room & equipment adequate to install 3 ea AN/GSQ85, 3 ea AN/GSQ77 & 2 ea AN/MSC-99.

1 - 10-man classroom.

1 - 10-man classroom and 1 ea AN/GSQ85, AN/GSQ77, AN/MSC99

1 - 10-man classroom and an AT-904 AT-907 and 5KW Gen.

1 - 10-man classroom and a mockup ea of control panels for tactical positions ABC13, DEFG6 and H2R37.

Requires Tld Equ of 3 ea ABC13, 2 ea DEFG6 and 1 ea H2R37.

Annex C

TOTAL EQUIPMENT REQUIREMENTS FOR INSTRUCTION OF
MOS 000
ASSUMING THE STATEMENTS IN ANNEX B TO BE CORRECT

Line Item Number	Equipment	Quantity
N/A	10-man classroom	3
N/A	10-man equip lab	1
0**001	AN/GSQ-88	4
0**002	AN/GSQ-77	4
0**003	AN/MSC-99	3
0**004	AT 904, antenna	1
0**005	AT 903, antenna	1
0**006	1.5 kw gen	1
N/A	Mock control panels	
	ABC-13	1
	DEFG-4	1
	MMR-37	1
N/A	Complete mobile positions	
	ABC-13	4
	DEFG-4	4
	MMR-37	2

CHAPTER 10

DETERMINING INSTRUCTOR REQUIREMENTS

A. INTRODUCTION

1. _General_. At this point in the development of an instructional system, the training objectives have been translated into performance terms, a criterion measure has been prepared, course content has been selected, a tentative course sequence has been developed, tentative time allocations have been set for each instructional block, and an instructional strategy has been chosen. All of the foregoing steps provide data which must be carefully weighed in determining the number, kind, and skills of instructors required to conduct the course.

2. _Phases in the Development of Standards_. If instruction is to be conducted with optimum effectiveness, efficiency, and economy, scientific standards based on data derived from experimental studies must be applied in determining instructor requirements. However, scientific standards cannot be established overnight. A start must be made somewhere. For this reason, instructor standards are developed in three phases:

    a. _Judgmental Phase_. The initial determination of instructor requirements is established largely by the application of judgment, and supplemented by local experience and review of standards used in similar training situations.

    b. _Experimental Phase_. Once judgmental standards have been established and put into effect in a course of instruction, experimental standards, based on observation and experience with the standards, are applied. That is, the judgmental standards are modified as a result of local experience with the standards.

    c. _Scientific Phase_. Lastly, experimental standards are subjected to rigorous and carefully controlled tryout. Analysis of the data resulting from controlled experimentation produces scientific standards for use in determining instructor requirements.

B. INSTRUCTOR SKILLS

1. _Bases for Selection_. The content of a specific block of instruction and the instructional strategy chosen dictate the type of instructor required to handle the block. Although all instructors have been exposed to instructor training, their previous technical experience, their platform experience in terms of amount and kind, their instructional skills, and their preferences for certain methods of instruction vary considerably. The objective in assigning instructor responsibility in a specific content area is to select the best qualified man in terms of possessing both the technical competency and the instructional skills required to use the optimum strategy.

2. <u>Instructor Capabilities</u>. Different instructional strategies make varying demands on the instructor. Regardless of which strategy is used, the basic requirement is knowledge of the subject matter. An instructor cannot teach what he does not know. In addition to this primary consideration, there are instructor skills and abilities which are critical to the successful application of any strategy. These critical skills and abilities and related strategies are identified below:

    a. <u>Lecture Method</u>. The instructor must be able to:

        (1) Organize subject matter for effective oral presentation.

        (2) Speak clearly, forcefully, and effectively.

        (3) Stimulate interest and enthusiasm, and "sell" the importance of his subject.

        (4) Vary his presentation, in terms of vocabulary, sentence structure, and illustrations, to fit his audience.

        (5) Select wisely and use skillfully a variety of training aids.

        (6) Check the adequacy of his presentation through the effective use of on-the-spot techniques; e.g., questioning.

    b. <u>Conference Method</u>. The instructor must be able to:

        (1) Speak clearly, effectively, and informally.

        (2) Stimulate student interest and participation.

        (3) Maintain an informal atmosphere.

        (4) Provide the guidance required to keep the group continuously aware of desired teaching points and instructional objectives.

        (5) Keep the group aware of how well it is meeting its goals.

        (6) Summarize discussion points quickly and clearly.

    c. <u>Demonstration Method</u>. The instructor must be able to:

        (1) Organize his demonstration to effect the most efficient learning.

        (2) Use tools, equipment, and aids skillfully.

        (3) Speak clearly, forcefully, and effectively.

        (4) Adjust his commentary to the group.

        (5) Diagnose group difficulties and provide immediate remedial measures.

    d. <u>Performance Method</u>. In addition to the skills defined in paragraph c, above, the instructor must be able to:

        (1) Diagnose <u>individual</u> student learning difficulties.

        (2) Function effectively as a tutor.

    e. <u>Programmed Instruction</u>. The instructor must be able to:

        (1) Diagnose individual student learning difficulties.

        (2) Conduct tutorial-type remedial instruction.

        (3) Motivate, counsel, and guide each student.

        (4) Determine the appropriate pace to be maintained by each student.

    f. <u>Other Strategies</u>.

        (1) To function effectively as an instructor using a combination of methods, or in team learning, the instructor must be able to perform all of the functions defined in subparagraphs a. through e. above.

(2) For team teaching, the skills required will vary
with the position the instructor occupies on the team, the grouping
arrangement, and the strategy involved. The team leader must be able
to perform all of the functions identified in paragraphs a. through e.
above. A team member, however, is not required to have the full range
of instructional skills.

C. STANDARDS

1. Preliminary Considerations. In addition to data pertaining
to the course of instruction referred to in section A, para 1 above,
the determination of instructor requirements must be based upon equi-
table instructor workloads, reasonable student-instructor ratios, and
realistic platform-to-preparation time ratios.

2. Interim Standards. Until such time as experimental and sci-
entific standards can be developed, the standards described below and
as specified in annex A will be applied.
    a. Maximum Number of Platform Hours. A reasonable workload
is essential to effective instruction. Although it may be possible to
schedule an instructor for eight consecutive hours of instruction, the
quality of his instruction is likely to deteriorate considerably as the
day progresses. In addition, to be effective, instructors must be well
prepared and rehearsed. Time must be allotted for preparation and
rehearsal. For these reasons, instructor workload during a specific day
and during a specific week must be limited. Since certain types of
instruction are more demanding in terms of both lesson preparation and
the conduct of the lesson, different maximums must be set for each
instructional strategy. Interim standards, in terms of maximums, are
defined in columns 2 and 3, annex A.
    b. Ratios of Platform-to-Preparation Time. Different
instructional strategies require varying amounts of preparation time.
It should also be evident that the original preparation for an instruc-
tional unit requires considerably more time than preparation for subse-
quent repetitions of the same lesson. The complexity of content, the
availability of reference materials, and the amount of research required
are variables which may necessitate a great deal more preparation time.
For this reason, the interim standards for the platform-to-preparation
time ratios, defined in columns 4 and 5, annex A, are stated as
minimums for initial preparation and as maximums for succeeding or
repeated presentations given by the same instructor.
    c. Instructor-to-Student Ratios. The number of students that
can be handled adequately by one instructor is mainly a function of the
strategy employed. At times, however, the content, particularly that
which deals primarily with the development of manipulative skills, dic-
tates larger instructor-to-student ratios. For this reason, the interim
standards for instructor-student ratios, defined in column 7, annex A,
are maximums. In short, limitations of content, room size, equipment,
and the like may require smaller numbers of students per instructor than
the indicated ratios.

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D. PROCEDURES

1. Determining the Number of Instructors Required.

a. Introduction. The number of instructors required to con-
duct a course of instruction is the product of:

(1) The number of program of instruction (POI) hours of
each "type" instruction.

(2) The "instructor factor" for each "type" instruction.

(3) The "platform/preparation factor."

(4) The number of classes taught per year.

(5) An additional allowance of 10 percent for super-
vision, 11 percent leave and sick, and 4 percent commander's time.
The procedures for performing these calculations are defined in
ASATC&S Reg No. 616-2. All calculations are entered on IAT Form 178
(annex C).

b. Instructor Factor. This factor represents the average
number of instructor man-hours required to teach each scheduled academic
POI hour, in each method of instruction. The actual POI teaching hours
are separated according to the instructional methods as specified in
the course POI. A determination of the average number of instructor
man-hours required for each scheduled POI hour in each method of
instruction is made (annex B). The following items must be considered
for each instructional method when determining the instructor factor:

(1) The number of students in a class.

(2) The number of student positions available in the
classroom or training area (including both seating and equipment posi-
tions).

(3) The physical layout of the training area.

(4) Safety requirements.

(5) Course content, particularly that which deals pri-
marily with development of manipulative skills.

(6) Any other special or limiting factors.

c. Platform Preparation Factor. This factor represents a
relationship between the number of hours an instructor can teach a
specific course of instruction per day and the total number of teaching
hours available per day. If it is determined that due to the complexity
of the instructional material an instructor can teach only two hours per
day and there are eight hours available in the school day, the platform
factor is 8 divided by 2, or 4.0. The following items must be consid-
ered in determining the platform/preparation factor:

(1) Complexity of the material to be presented.

(2) The availability of materials.

(3) The amount of research required.

2. Determining the Types of Instructors Required. The instruc-
tional skills required to conduct a specific instructional block are
implicit in the content to be presented and in the strategy selected to
teach it. The steps in determining the type of instructor required are
as follows:

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a. Check the POI[1] to determine what the recommended primary instructional strategy is.

b. From the POI, note the technical content to be presented.

c. Compare steps a. and b. against the current list of assigned instructors, considering their technical knowledge and experience, and their instructional competencies.

d. Select the best qualified instructor and assign him the responsibility for the block of instruction. Select the second best qualified instructor as his alternate.

e. If the desired combination of technical background and instructional competence cannot be obtained:

(1) Go through steps 1.b. through d. with the alternative strategy noted in the POI.

(2) Submit a request for the assignment of an instructor who possesses the required qualifications when the missing element is technical competence.

(3) Arrange to have the best qualified instructor receive special training from Instructional Methods Division if the missing skill is instructional.

3. Determining Instructor Grade Authorizations. The grade structure for enlisted instructors can be ascertained from section VII, AR 611-201.

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[1]See Chapter 12

CHAPTER 11

SETTING COURSE PREREQUISITES

A. INTRODUCTION

1. <u>Definition</u>. Prerequisites are the minimum qualifications which a man must have prior to enrollment in a course of instruction. Prerequisites represent a prediction of the aptitudes, knowledge, skills, and experience required for successful course completion. Prerequisites may be general or special. General prerequisites are applicable to all courses of instruction and are required of all enrollees in addition to the general prerequisites.

2. <u>Authority</u>. The Commanding General, USASA is responsible for setting course prerequisites for ASA military occupational specialties. These prerequisites are established in accordance with DA, NSA, and USCONARC standards, and are promulgated in Army regulations and DA Pamphlet 350-10 by The Adjutant General who insures compliance with minimum Army standards.

3. <u>Uses of Prerequisites</u>.
   a. Administrative. The primary reason for establishing prerequisites is to insure that the right men are selected for a training program. That is, prerequisites are set so as to increase the chances of satisfactory course completion by personnel selected for training. Therefore, prerequisites are used to establish and apply screening and selection instruments and procedures for assigning personnel to training programs. Specifically, prerequisites are used in the screening and selection process as follows:
      (1) <u>Selecting/developing aptitude tests</u>. The selection or development of appropriate aptitude tests is reliant on the accurate identification and precise definition of those aptitudes which are required for successful completion of the course. For example, if digital dexterity is identified as a prerequisite for training as an electronics equipment repairman, those responsible for screening and assigning personnel to repair courses must select (or devise) and administer a test of digital dexterity.
      (2) <u>Screening applications/records</u>. A list of prerequisites is essential in the conduct of the preliminary screening of applications for course enrollment and for the screening of records to determine personnel to be assigned to a course of instruction. Unsuitable personnel can be easily and quickly eliminated from consideration if a well-conceived list of prerequisites is available.

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(3) Interviewing applicants/nominees. If the personal interview is used as a part of the screening and selection process, a list of prerequisites can serve as the starting point in collecting data about course applicants or nominees. Such a listing will insure that the information required for objective evaluation is obtained and that areas of particular interest are fully explored by the interviewer.

b. Instructional. Prerequisites can also serve instructional purposes. Two of the more important uses of prerequisites in instruction are as follows:

(1) Lesson planning. Instructors can advantageously use prerequisite lists in planning their work and in developing instructional materials. The aptitudes, abilities, and experience of the student input have a direct bearing on the selection of appropriate instructional strategies and the development of instructional materials. To plan adequately, the instructor must have accurate information about the characteristics of the typical student. He needs to know what the student brings to the training program. A well-written list of prerequisites meets this need.

(2) Constructing tests. Student aptitudes and abilities must be considered in selecting or developing evaluative instruments and techniques. A knowledge of the prerequisites of a course is essential to the construction of appropriate achievement tests, particularly as they relate to the type of test, the instructions to the student, the complexity of sentence structure, and the vocabulary level.

4. Importance of Prerequisites.

a. Prevent Waste of Training Resources. Some years ago, aptitudes were considered to be special talents which were due exclusively to innate or hereditary differences among people. Today, aptitude is more accurately defined as a mixture of inborn potential and acquired abilities. Regardless of how aptitude is defined, it is important to remember that different types of work, and the training for that work, require different combinations of ability and experience. Training resources will be wasted if the personnel selected to receive training do not have the required aptitudes. To be effective and efficient, training must be provided only to students who have been carefully screened and selected for suitability. However, before screening and selection procedures can be applied, the selection requirements and the prerequisites of the training program must be identified and described with precision. Successful establishment of realistic and adequate prerequisites prevents the waste of time and other training resources by increasing the chances that enrollees in a particular course will complete it satisfactorily.

b. Insure an Acceptable Level of Performance in the Field. Establishing prerequisites which make certain that students assigned to a course have the aptitudes, abilities, and experience to complete the course successfully and at acceptable time and resource cost levels is only one aspect of the problem. Prerequisites must also insure that

graduates of the training program will be able to perform their assigned
duties at an acceptable level of proficiency when they arrive at field
units. If prerequisites are set too high, the number of individuals
available for a given course of instruction, and ultimately for assign-
ment to a given job, is sharply reduced. On the other hand, if prerequi-
sites are set too low, a heavier investment in training must be made to
bring the trainees up to an acceptable level; but, if the additional
investment of training resources is not made, the consequence will be
reduced levels of initial job performance, increased on-the-job training
requirements, and a decrease in unit efficiency in performing its mis-
sion. It is also likely that the attrition rates will increase. The
solution to the problem lies in establishing prerequisites at the right
level; i.e., neither too high nor too low.

B. ELEMENTS OF PREREQUISITES

There are basically five elements to be considered in setting the
prerequisites for any course of instruction. These elements are desig-
nated as follows:

1. _Administrative_. This element contains items which insure com-
pliance with Army regulations with respect to:
      a. Length of obligated service (AR 600-200 and 350-100).
      b. Status requirement (military or civilian; active or reserve).
      c. Pay grade (enlisted, officer, or civilian).

2. _Physical_. This element includes the following qualification
areas that will insure proper physical capability to engage in the activ-
ities of the MOS for which trained:
      a. Physical profile serial (AR 611-101 and 611-102).
      b. Physical skills (AR 611-201 and 611-202).
      c. Special requirements (e.g., color perception for electronic
maintenance training).

3. _Clearance_. This element includes special ASA requirements per-
taining to:
      a. Security clearance.
      b. Briefing for special intelligence.

4. _Academic_. This element may include any of the following appli-
cable educational or aptitude considerations:
      a. Military training and experience.
      b. Civilian training and experience.
      c. Army aptitude area scores (AR 611-201).
      d. Special skills, abilities, or knowledge.
      e. ASA or NSA aptitude test scores.
      f. Civilian aptitude test scores (e.g., IBM ADPS Programmers'
Aptitude Test)

5. **Other**. This element may include any other requirements.
   a. Personality traits.
   b. Temperament.
   c. Special factors (e.g., citizenship, etc.).

C. PROCEDURES

1. **Establishing Prerequisites**.
      a. Chief, Evaluation Unit will identify, list, and describe the prerequisites for each course of instruction as outlined in section B of this chapter. In developing these prerequisite statements, the following sources of data will be used:
         (1) Mission task as established by HQ, USASA, NSA, and supported commands.
         (2) Pertinent DA, USCONARC, and HQ, USASA regulations and directives.
         (3) Command Job Analyses Reports. Particular attention will be given to the following items:
            (a) Summary description of the position, which should be related to the initial job requirement.
            (b) Detail of duties and tasks, which should be related to the course content.
            (c) Knowledge and skill requirements, which should be related to course content, civilian educational level, and aptitude area scores.
            (d) Aptitude, physical, and personal requirements, which should be related to standards established by DA, USCONARC, and HQ, USASA.
            (e) General comments, which should contain any additional pertinent information.
         (4) School training requirements as defined in the training objectives. (See chapter 2.)
         (5) The outline of course content developed from the Performance Objective Workcards. (See chapter 6.)
         (6) Field evaluation reports, to include the comments of commanders, supervisory personnel, and job incumbents. (See chapter 15.)
         (7) The judgments of field experienced instructors and supervisory personnel. (See chapter 13.)
      b. Initial statements of prerequisites will be submitted by Chief, Evaluation Unit to the following for review:
         (1) Technical Consultant.
         (2) Educational Consultant.
         (3) Director, Office of Personnel and Administration.
         (4) Director of Instruction.

      c. Upon receipt of concurrences of personnel listed in paragraph b above, prerequisites will be submitted to the Assistant Commandant for review and approval for use in pilot courses.

2. Evaluating Prerequisites.
   a. Pilot Course Evaluation.
        (1) During the conduct of the pilot course/s, Chief,
Evaluation Unit will gather objective data for later use in revising
prerequisites as required. The following sources will be used to col-
lect data for evaluating the adequacy of prerequisites.
                (a) Student opinion surveys.
                (b) Student interviews.
                (c) Instructor interviews.
                (d) Instructor surveys.
                (e) Classroom/laboratory observation.
                (f) Analysis of tests and quizzes.
        (2) At the conclusion of each pilot course, Chief,
Evaluation Unit will evaluate prerequisites by the following means:
                (a) Analysis of all go/no-go performance tests based
on statistical analysis provided by Chief, Evaluation and MOS Test Divi-
sion as follows:
                    1. Correlation and regression analyses, i.e.,
the relationship between prerequisites (dependent variable) and class-
room performance (independent variable).
                    2. Statistical techniques will also be applied
to the performance of academic failures and recycled and diverted stu-
dents.
                (b) Student surveys and interviews
                (c) Instructor surveys and interviews.
   b. Field Evaluation. Systematic evaluation of the perform-
ance of graduates of pilot courses will be accomplished by Chief,
Evaluation Unit as a part of field evaluation followup visits. Speci-
fically, the following checks will be made:
        (1) The adequacy of current prerequisites in providing an
adequate supply of qualified personnel to field units.
        (2) The need for on-the-job (OJT) training; i.e., are OJT
requirements excessive or acceptable to commanders?
        (3) The relationship between performance in the school
and performance on the job.

3. Revising Prerequisites.
   a. Following completion of the actions described in paragraph
2 of this chapter and after analysis of the data, Chief, Evaluation Unit
will draft and staff a revised set of prerequisites as follows:
                (1) Technical Consultant.
                (2) Educational Consultant.
                (3) Director, Office of Personnel and Administration.
                (4) Director of Instruction.
                (5) Assistant Commandant.
   b. Upon receipt of concurrences in the revised list of pre-
requisites, Chief, Evaluation Unit will prepare a letter to the Commanding
General, USASA recommending a change to the AR job description. The

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letter will include:

(1) Identification of the weaknesses of existing prerequisites based on the findings of in-school and field evaluation. These weaknesses may indicate that the prerequisites are set either too low or too high.

(2) Identification of proposed prerequisites that will correct the deficiencies noted.

D. REFERENCES

1. AR 611-101.

2. AR 611-102.

3. AR 611-201.

4. AR 611-202.

5. AR 600-200.

6. AR 350-100.

7. DA Pam 350-10.

8. DA, Army Job Analysis Manual I, March 1960.

9. Letter, IATOP-T, HQ, US Army Security Agency, 13 February 1960, subject: Programs of Instruction and Lesson Plans.

10. USASA Command Job Analysis System, Job Analysis Handbook and Guide, Edition II, Evaluation Unit, USASATC&S, Fort Devens, Mass., 1966.

CHAPTER 12

DEVELOPING INSTRUCTIONAL MATERIALS

A. REVIEW OF STEPS

At this point in the development of an instructional system, both the input to the training program and the required output have been described in detail. The input has been identified in terms of prerequisites for enrollment in the training program, and the required output has been described in terms of performance objectives. In addition, the means of producing the desired product have been specified. That is, the instructional strategy, together with its supporting training aids, has been selected; equipment and instructor requirements, in terms of kinds and number, have been determined; and criterion measures both internal and end-of-course, have been prepared. The next step is to produce the documents which collate these data into readily usable form and to set time allocations for each instructional unit.

B. PROCEDURES

1. Preparation of Lesson Plans.
   a. General.
      (1) In addition to the information contained in this section, the guide for the preparation of lesson plans (LP) and the sample LP commencing on page 12-15 will be used in preparing LP. Additional guidance may be found in the USASATC&S Style Manual, ST 32-4000.
      (2) Performance objective workcards furnished by the Evaluation Unit and their supporting content outlines developed by the responsible academic elements provide the basic sources of guidance for determining LP content.
      (3) In preparing LP, coordination within each department and with other departments will be effected to insure that there is no unnecessary duplication or conflict in the content to be presented.
      (4) At least four copies of each LP will be prepared to insure the distribution listed in paragraph d below.
      (5) Classified LP will comply with the provisions of current security regulations.
      (6) Academic departments will maintain a file of all LP currently in use in their departments (except LP containing crypto-material).
   b. Preparation of Draft Copies.
      (1) LP will be prepared by the academic department in accordance with the provisions of this chapter, to include the sample LP provided, (annex B, pages 12-15 through 12-18), and references cited in section C of this chapter.

(2) Academic departments will incorporate the latest doctrine in each LP. Where doctrine has not been clearly defined in official publications, academic departments will consult with the Director, Office of Training Literature to establish the "school position."

(3) LP as prepared internally will be submitted in draft form to the department director for review.

(4) Each LP will be thoroughly reviewed by the responsible department director for format, organization, strategy, training aids, accuracy of content and references. Necessary changes will be made prior to forwarding the LP to the Office of Training Literature for review and editing.

(5) Director, Office of Training Literature, will insure that each LP is doctrinally accurate and editorially correct, and return the document to the appropriate academic department.

c. Preparation of Final Copies. Upon receipt of an edited draft copy, department directors will be responsible to:

(1) Prepare the LP in sufficient copies to permit the distribution indicated below. A copy of the final LP will be furnished to the Director, Office of Training Literature for proofreading prior to publication/distribution.

(2) Type on multilith masters LP requiring reproduction and forward the masters to the Director, Office of Training Literature for proofreading prior to publication. Multilith masters containing errors will be returned to the appropriate academic departments for correction. After correction of errors by the originating academic department, the masters will be routed through Director, Office of Training Literature to Chief, Reproductions Section for publication.

d. Distribution.

(1) A minimum of one original and three copies of each approved LP will be prepared. Distribution will be as follows:

(a) Original to Director, Office of Training Literature (Director, Department 3 for cryptomaterial) for the command record copy file.

(b) One copy for the instructor's file.

(c) One copy for the monitor's desk file.

(d) One copy for the department's file.

(2) Additional copies may be prepared in such numbers as the department director deems necessary.

2. Time Allocations. Realistic estimates of the amount of instruction time a student requires to develop necessary job performance standards cannot be made until a lesson plan has been drafted. Since no experience factor is available for performance-oriented instruction, initial time allocations must be calculated mathematically. To do these calculations properly several factors must be considered, both individually and in combination.

a. Factors to Consider in Estimating Time Requirements.

(1) The type of content involved. The nature of the content (whether a series of facts and principles or a skill) has a direct relationship to time requirements.

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(2) The amount of detail. The number of separate facts or principles, or the number of separate elements within a skill, relates to time requirements.

(3) The learning difficulty. Difficulty in the learning of a specific principle, concept, or skill has a direct bearing on the time required to teach it.

(4) The instructional strategy. The method or medium (lecture, programmed instruction, performance) used to teach the principle, concept, or skill relates to time.

(5) The testing strategy. Time requirements will vary with the type of evaluation strategy used. For example, individual testing requires more time than group testing; performance tests usually require more time than paper- and- pencil instruments.

(6) Number of students. The factor of class size is of primary importance when coupled with other factors; e.g., strategy, equipment, and instructors.

(7) Number of instructors. The availability or non-availability of assistant instructors has a direct relationship to time.

(8) Number of equipment positions. The nonavailability of equipment positions in sufficient numbers to accommodate the number of students in a class will materially increase the amount of time required.

(9) Movement of students. If students must be moved or transported to a training area away from the central school facilities, time requirements will be increased.

b. Estimating Time Requirements. Experienced instructors will be asked to provide three estimates of the amount of time required for the students to learn the content detailed in the plan. Estimates will be based upon consideration of the factors defined in paragraph a above. The three estimates are as follows:

(1) The longest time it would take if the students are slow, the class is scheduled late in the day, the equipment breaks down, etc.

(2) The most likely time for the development of the concept or skill, considering that all conditions are routine.

(3) The shortest time it could take considering that all conditions are optimum, all students are fast learners, all equipment is ready and operating, etc.

c. Calculating Time Requirements. The three estimates are averaged within themselves. That is, an average is obtained for each estimate of the longest (EL), most likely (EML), and shortest (ES) time estimates as shown.

$$\frac{EL_1 + EL_2 + EL_3}{3} = Avg\ EL$$

and,

$$\frac{ES_1 + ES_2 + ES_3}{3} = Avg\ ES$$

The final time estimate is calculated as follows:

$$\text{TE (Time Estimate)} = \frac{\text{Avg EL} + 4 \text{ Avg EML} + \text{Avg ES}}{6}$$

d. _Refining Time Estimates_. The time estimates computed at this point are gross as compared to net, but for planning purposes they are useful. For the first course taught under the new system, these time estimates will be entered on the LP and used. The time allocations will be revised for subsequent classes where actual experience with students indicates a need for change.

3. _Review of LP_. To insure that all material covered in lesson plans used within this command is current, the following procedures will be adhered to by all concerned.

a. _Instructors_ will at all times insure that their respective plans are maintained on a current basis. Continual review of material presented is a requirement. Recommended changes will be coordinated with Chief, Evaluation Unit prior to publication.

b. _Directors, Academic Departments_ will insure that all LP within their respective activities are _reviewed annually_ as follows:

(1) Review will be accomplished annually during the month that the plan was originally published. Review can also be initiated by the Office of Training Literature or the Evaluation Unit, based on receipt of additional or revised information. In such an event, timely notification will be provided to academic elements concerned in order to permit accurate revision.

(2) Date of review, grade, name, and title of person making the review, and initials of the individual signing the review, will be shown on the cover sheet portion of each LP.

(3) Custodian of the command master LP file will be notified by disposition form (DD Form 96) of the annual review. Disposition form will include the date of review, grade, name, and title of person making the review.

c. _Custodian of the command master LP file will_, upon receipt of notification that such a review has been completed, take the action indicated in paragraph 3b(2) above as it pertains to the master LP file copy.

4. _Preparation of POI_.

a. _General_.

(1) Programs of instruction (POI) will be prepared in accordance with the information contained in this section and in Annex C, Guide to Preparation of POI. Academic departments will prepare POI and their supporting lesson plans (LP) in accordance with instructions contained herein, insuring that all such documents are current, reviewed annually, and distributed as outlined in this chapter. A POI will be self-contained in that actual job requirements, developed from job analysis data, can be directly correlated with the performance objectives

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contained within individual lesson plans. Academic departments will also prepare LP change sheets, calculate and refine time allocations, and maintain departmental files of all current POI and LP.

(2) The basic sources of material for POI are the performance objectives, as expressed in the individual LP objective statements developed by the responsible academic element, and the performance objective workcards provided by the Evaluation Unit.

(3) The Chief, Evaluation Unit will assist academic elements in establishing time allocations for instructional units and conduct research studies designed to validate time allocations. In addition, the Evaluation Unit will coordinate the preparation, staffing, publication, and distribution of POI, provide performance objective workcards, and review POI and LP change sheets.

(4) Recommendations for changes resulting from staffing these documents will be coordinated by Chief, Evaluation Unit with the director of the responsible academic department, the Office of Training Literature, and any other academic or staff element concerned.

(5) Classified POI will comply with the provisions of current security regulations.

(6) The Assistant Commandant will provide overall staff supervision for the preparation of POI and will approve each POI prior to publication.

(7) The Educational Consultant will advise and assist in the establishment of procedures for setting time allocations and for structuring POI and their components.

(8) The Director of Instruction will supervise the establishing of time allocations, the preparation of POI and their components, and assignment and control of lesson plan digraphs.

b. Preparation of Draft Copies.

(1) Draft POI will be prepared by the responsible academic department in accordance with the provisions of this chapter, to include the sample POI (annex D). Coordination in preparation of the various sections of the document will be initiated with other staff elements as follows:

        (a) SECTION I - Office of Plans and Programs.
        (b) SECTION II - Evaluation Unit
        (c) SECTION III - Evaluation Unit
        (d) SECTION IV - Evaluation and MOS Testing
        (e) SECTION V - Evaluation Unit

(2) After approval of the draft POI by the Director of the responsible department it will be provided to the Director, Office of Training Literature for determination of doctrinal accuracy and editorial correctness. The document will be returned to the academic department for correction, if required.

(3) Chief, Evaluation Unit will then review the draft document and circulate it for further review and comment/concurrence as follows:

(a) Technical Consultant
(b) Educational Consultant
(c) Director of Instruction
(d) Assistant Commandant (for approval)

c. <u>Preparation of Final Copies</u>. Upon completion of staffing and approval of the POI by the Assistant Commandant, the final POI will be prepared on multilith masters by Plans Division, Office of Plans and Programs. Sufficient copies will be prepared to permit the distribution currently required. The multilith masters will be furnished to Director, Office of Training Literature for proofreading prior to publication.

d. <u>Preparation and Filing of LP Containing Cryptomaterial</u>.

(1) Director, Department 3 will be responsible for preparation of LP containing cryptomaterial and the crypto portion of POI for all enlisted courses, except the Senior Noncommissioned Officer Course. However, all copies of approved LP and POI containing cryptomaterial will be filed with the crypto custodian, Office of Personnel and Administration, except when in use by an instructor.

(2) Director, Department 5 will be responsible for preparation of LP containing cryptomaterial and the crypto portion of POI for the Senior Noncommissioned Officer Course, all warrant officer and officer courses. However, all copies of approved LP and POI containing cryptomaterial will be filed with the crypto custodian, Office of Personnel and Administration, except when in use by an instructor.

5. <u>Revision of POI and LP</u>. Documents requiring revision due to minor changes (ten percent or less of total hours of instruction) will be revised by the appropriate academic department, forwarded to the Office of Training Literature for editing, and to Chief, Evaluation Unit for final review. Upon approval by Chief, Evaluation Unit, documents will be prepared in sufficient copies and distributed by means of change sheets carrying the POI and/or LP identification numbers. Change sheets for POI and LP will be numbered sequentially and prepared in the format shown on page 12-34 of this chapter (annex E). Plans Division, Office of Plans and Programs is responsible for preparation of approved POI change sheets. Academic departments concerned are responsible for preparation of LP change sheets. Distribution will be the same as that of the original POI or LP. Major POI and LP revisions (more than ten percent of total hours of instruction) will be processed in the manner prescribed for new POI and LP.

6. <u>File Systems for POI and LP</u>.

a. <u>Office of Training Literature File</u>.

(1) The Training Literature file will consist of an original copy of each POI and the command's record file copy of each supporting LP (except those dealing with cryptomaterial). The Training Literature file will not contain any tests, examinations, evaluations, visual aids, or other training aid materials.

(2) Removal of material from the Training Literature file must be approved by the Director, Office of Training Literature.

h. Cryptomaterial File. Crypto Custodian, Office of Personnel and Administration will maintain the command's record file copies of all crypto POI, LP, and evaluation materials used by Evaluation and MOS Test Division. These documents and evaluation materials will not be released from file without the approval of the crypto custodian.

c. Academic Department Files. Directors, Academic Departments will establish filing procedures within their respective activities to insure that copies of all current POI and LP, including revisions, are available for each of the following files:

(1) Department file.

(2) Instructor file (LP only).

d. Retirement of POI and LP.

(1) Academic department files. Directors, Academic Departments will destroy all POI and LP immediately after they have been superseded or replaced by new or revised documents.

(2) Training Literature and cryptomaterial record files. Director, Office of Training Literature and the crypto custodian will retire the command's record file copies of POI and LP to the records holding area. Coordination will be effected with the Records Management Officer, this headquarters. Documents retired will be those LP superseded or replaced by new or revised plans and those POI which have been superseded, rescinded, or discontinued.

7. Distribution of POI and LP Outside the Command. Requests from organizations outside of this School for POI and LP produced by this headquarters will be referred to the Director, Office of Academic Operations for compliance.

ANNEX A

GUIDE FOR THE PREPARATION OF LESSON PLANS (LP)

(See format, pages 12-15 to 12-18.)

GENERAL

MARGINS: Allow 1 inch (12 spaces) for the left and right margins. Leave at least 1-1/4 inches at the top and bottom of each page.

PAPER: LP will be prepared on white, 8 x 10-1/2 inch paper on one side only. Depending on the number of copies required, they may be typewritten for less than 10 copies (white bond and white tissue copies); or the multilith process or 914 copy machine process may be used for more than 10 copies.

PART I - TITLE SHEET AND AUTHENTICATION PAGE

HEADING: Self-explanatory. See example.

PARAGRAPHING: See included format (annex B).

FILE NO.: Enter the appropriate digraph letters and the LP number.

DATE: Enter date LP is approved by the approving authority.

MOS DUTY AND TASK IDENTIFICATION: Enter the duty and task numbers/ letters found on the performance objective workcards which the LP supports.

TIME ALLOCATION: Enter the number of hours/minutes allocated to the LP.

CLASSIFICATION: Enter the letter designating the security classification of the instruction; e.g., (U) - UNCLASSIFIED; (C) - CONFIDENTIAL; (CMHA) - CONFIDENTIAL - MODIFIED HANDLING AUTHORIZED; (S) - SECRET; etc.

TITLE OF LESSON: Enter the title of the lesson and the title's classification.

INSTRUCTIONAL STRATEGY: Enter the primary and, if applicable, the secondary instructional strategy to be used; e.g., Primary - demonstration, Secondary - performance; Primary - programmed instruction, Secondary - performance; Primary - lecture with student response system; Primary - computer-based instructional system.

CLASSROOM OR AREA REQUIREMENTS: Specify what facilities (type, size, etc.) will be required.

EVALUATION STRATEGY: Enter the description of the means to be used to check student performance on this task, element, or collection of elements.

INSTRUCTORS: List the number of instructors and assistant instructors required.

TRAINING AIDS AND EQUIPMENT: List all required training aids and equipment.

REFERENCES:

    1. For the Student.

        a. Study references must be specific.

        b. Show paragraphs and pages as well as book or manual title.

    2. For the Instructor. List references which provide necessary background for the instructor.

STUDENT SUPPLIES REQUIRED: List supplies the student will be required to bring to class; e.g., pen, pencil, unclassified notebook, etc.

STUDENT HANDOUTS: List all types of handouts (outlines, advance sheets, programmed materials, etc.) to be given to students during the class meetings.

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TRANSPORTATION: List transportation requirements, to include times and places.

AUTHENTICATION: Each LP will contain the signature boxes of the preparer, and reviewer; and the approval boxes of the Department Director and the Chief, Editorial Division. Each item must be completed, and the authentication will appear on all copies of each plan issued. If the reviewer is the same as the individual preparing the plan, the statement in the reviewing box will read, "Same as preparer." Academic department directors may not further delegate their approving authority.

ANNUAL REVIEW: Each LP will include three annual review statements. These items will be placed on all copies of each plan published. However, they will not be completed by the appropriate custodian until the annual reviews have been accomplished.

PART II - BODY STYLE

Title. Self-explanatory. See example.

Paragraphing. Paragraph numbering and lettering, heading, and indentation will be as outlined in the Style Manual, this headquarters, July 1965.

1. Arabic numerals show the phase of instruction, i.e., INTRODUCTION, EXPLANATION, and SUMMARY. Type all in CAPS. From the margin, indent five spaces and begin typing on the sixth space.

2. Lowercase letters show main teaching points. From margin, indent 9 spaces and begin typing on the 10th space.

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3. Arabic numerals in parentheses are used to show facts, School position, or other evidence supporting the main teaching points. From margin, indent 13 spaces and begin typing on the 14th space. Block the second and succeeding lines of all paragraphs in this and lower subparagraph subdivisions. (See included sample LP format.)

4. Lowercase letters in parentheses are used to show important items listed under arabic numerals in parentheses. From margin, indent 18 spaces and begin typing on the 19th space.

5. Arabic numerals underlined are used to show subordinate data and supporting information listed opposite lowercase letters in parentheses. From margin, indent 23 spaces and begin typing on 24th space.

PART III - BODY DIVISION FORMAT

The three phases of a lesson will be typed in accordance with the following format:

1. INTRODUCTION. The introduction sets the stage for the lesson by establishing contact between the instructor and the class, arousing student interest, securing student attention, disclosing the nature of the subject, and clarifying the objectives.

a. Objectives. The lesson plan objectives will be stated in terms of the following headings:

    (1) Student behavior.

    (2) Conditions of performance.

    (3) Criterion of performance.

b. Importance. This item consists of a statement defining the reason for learning the content of the lesson, underscoring the importance of the material to the individual, and its relationship to a particular MOS required duty, task, or element.

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2. EXPLANATION. The explanation consists of the content materials and teaching points required to support the lesson plan objective statement. The subject matter is explained, performance is developed, understanding stimulated, and knowledge is enhanced. It is a breakout, in terms of specific principles or skills, of the content required to achieve the defined objectives. Each group of learnings for each objective and/ or sub-objective will be followed by a description of the technique of evaluation to be used in determining whether the performance standard (criterion) has been met.

> NOTE: Normally an LP will include in the EXPLANATION section, all training objectives for a specific learning set. However, some learning set performance objectives may involve content of such complexity and detail so as to produce an oversized document. In such cases, separate LP may be prepared for subdivisions of the particular subject matter. All LP will not necessarily contain separate sub-objectives for each teaching point. The format shown here is a guide and is not intended to connote that every heading used is always required.

a. Lecture Method. With this method, the explanation consists of a series of statements which logically develop the material to be learned.

b. Conference Method. Here the explanation consists of a series of key questions and answers which cover the facts, principles, and concepts of the lesson.

c. Demonstration Method. With this method, the explanation consists of a series of steps which, when demonstrated by the instructor, will present a visual image of how an operation should be performed.

d. _Performance Method._ The explanation here consists of a series of steps which, when practiced by the student, will result in the desired standard of performance.

e. _Programmed Instruction Method._ With this method, the explanation consists of an outline of the content covered by the programmed materials.

3. SUMMARY. The summary is a brief review of the complete presentation containing the following elements:

a. _Recapitulation._ This element consists of a brief repetition or restatement of the main teaching points covered in the lesson.

b. _Evaluation._ In this section, the means of determining whether the student's performance is go or no go will be described.

c. _Reemphasis._ Here, important ideas selected from the teaching points, steps of procedure, or safety or security precautions are reviewed for special reemphasis.

d. _Closing Statement._ This section consists of a strong concluding statement designed to leave with the students a lasting impression of the importance of the content.

PART IV - PACKET

Each LP will consist of a complete package of all graphic materials required to conduct the instruction. Therefore, the LP packet will consist of a copy of each student handout, worksheet, standard form, instructor quiz, and graphic training aid used in the instruction. The

original "art work" used for the production of Vu-Graph or 35mm slides
will be reproduced in sufficient copies by means of the ZEROX process or
by the 914 copying process to meet this requirement.

ANNEX B

EXAMPLE OF LP FORMAT

DIVISION, DEPARTMENT
UNITED STATES ARMY SECURITY AGENCY TRAINING CENTER AND SCHOOL
Fort Devens, Massachusetts 01433

*File No.:   Date ....
MOS Duty No.:   Task: Element:
Time Allocation:
Classification: ( )

TITLE OF LESSON PLAN (**)

INSTRUCTIONAL STRATEGY:

    1. Primary.

    2. Secondary (if applicable).

CLASSROOM OR AREA REQUIREMENTS:

EVALUATION STRATEGY:

INSTRUCTORS:

TRAINING AIDS AND EQUIPMENT:

REFERENCES:

    1. For the Student.

    2. For the Instructor.

STUDENT SUPPLIES REQUIRED:

STUDENT HANDOUTS:

TRANSPORTATION:

---

*This LP does not supersede any LP currently in use at this school.
**Classification of title and main paragraph headings should be indicated
only in classified lesson plans. If classified, classification would
appear where parentheses are now. If LP is not classified, there would
be no parentheses or classification shown.

LESSON PLAN AUTHENTICATION PAGE

AUTHENTICATION:

1. Prepared by: _____
                        (Signature)

    _____
    (Typed name, grade, branch of service)

    _____
    (Typed title)
    Date: _____

2. Reviewed by: _____
                        (Signature)

    _____
    (Typed name, grade, branch of service)

    _____
    (Typed title)
    Date: _____

3. Approved by: _____
                        (Signature)

    _____
    (Typed name, grade, branch of service)

    _____
    (Typed title)
    Date: _____

EDITORIAL APPROVAL:

Approved by: _____
                        (Signature)

    _____
    (Typed name, grade, branch of service)

    _____
    (Typed title)
    Date: _____

ANNUAL REVIEW:

Date: _____ Grade/Name: _____ Title: _____

    Posted: Date: _____ By: _____

Date: _____ Grade/Name: _____ Title: _____

    Posted: Date: _____ By: _____

Date: _____ Grade/Name: _____ Title: _____

    Posted: Date: _____ By: _____

LESSON PLAN TITLE

1. INTRODUCTION

    a. <u>Objective</u>.

        (1) Student behavior.

        (2) Conditions of performance.

        (3) Criterion of performance.

    b. <u>Importance</u>.

2. EXPLANATION

    a. <u>First Increment of Content</u>.

        (1) Subobjective.

            (a) Student behavior.

            (b) Conditions of performance.

            (c) Criterion of performance.

        (2) Content.

            (a) Fact.

            (b) Fact.

            (c) Principle.

            (d) Skill.

        (3) Evaluation.

    b. <u>Second Increment of Content</u>.

        (1) Subobjective.

            (a) Student behavior.

            (b) Conditions of performance.

            (c) Criterion of performance.

(2) Content.

      (a) Fact.

      (b) Fact.

      (c) Principle.

      (d) Skill.

(3) Evaluation.

c. Third Increment of Content.

  (1) Subobjective.

      (a) Student behavior.

      (b) Conditions of performance.

      (c) Criterion of performance.

  (2) Content.

      (a) Fact.

      (b) Fact.

      (c) Principle.

      (d) Skill.

  (3) Evaluation.

3. SUMMARY

a. Recapitulation.

b. Performance Evaluations.

c. Reemphasis.

d. Closing Statement.

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ANNEX C

GUIDE FOR THE PREPARATION OF PROGRAMS OF INSTRUCTION (POI)

GENERAL

MARGINS: Allow 1 inch (12 spaces) for the left and right margins. Leave at least 1-1/4 inches at the top and bottom of each page.

PAPER: POI will be prepared on white, 8-1/2 x 13 inch paper on one side only. Depending on the number of copies required, they may be typewritten for less than 10 copies (white bond and white tissue copies); or the multilith process or 914 copy machine process may be used for more than 10 copies.

TITLE PAGE

Heading: Self-explanatory. See example.

Month and Year: Self-explanatory.

POI Title: See format example (annex D).

MOS Title and MOS Number: Self-explanatory.

Length: Self-explanatory.

Supersession Instructions: Begin in the lower left-hand portion of the page.

TABLE OF CONTENTS

List each section of the POI by title in sequence.

SECTION I - PREFACE

Course: POI number and MOS title.

Purpose: The overall job performance requirements for the MOS will be stated in the objective terms of behavior, conditions, and criterion.

Prerequisites: List here all requirements that must be met prior to the student entering the course, i.e., educational level, security clearance, previous training, aptitude scores, etc.

Length: Hours for both peacetime and mobilization.

Training Location: Command and geographical location where training is actually conducted (i.e., USASATC&S, Fort Devens).

MOS Feeder Pattern: See format example.

Ammunition Requirements: Self-explanatory.

Common Subjects Recapitulation: Include those required subjects that are not an integral subject required for technical proficiency in the MOS, e.g., Counterinsurgency.

Standardization of Prefix Digit-5 Training. Self-explanatory.

Identification of Counterinsurgency Training: List separately the included hours of pure and integrated counterinsurgency training.

Type of Academic Instruction and Instructor Factors: Reflect the total hours by type of instruction. The instructor and platform factors will be derived as follows:

Instructor Factor.

Instructor factor represents the average number of instructor man-hours required to teach each scheduled academic POI hour in each method of instruction; e.g., the number of instructor man-hours for each scheduled POI lecture hour would be totalled and divided, to the second decimal place, by the number of POI lecture hours in the course, yielding the instructor factor for all lecture hours in that course.

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Example.

Total academic hours in the POI--368

    Total lecture hours-----------------------------------130

        *113 x 1 instructor man-hour = 113 man-hours

         17 x 3 instructor man-hours = 51 man-hours
                                       164 man-hours

        164 divided by 130 = 1.26 instructor factor.

    Total PE hours--198

        20 x 3 instructor man-hours = 60 man-hours

        178 x 5 instructor man-hours = 890 man-hours
                                       950 man-hours

        950 divided by 198 = 4.80 instructor factor.

    Total Exam/Demonstration/TP hours---------------------40

        2 x 1 instructor man-hours =   2.00 man-hours

        13 x 2 instructor man-hours = 26.00 man-hours

        25 x 3 instructor man-hours = 75.00 man-hours
                                     103.00 man-hours

        103 divided by 40 = 2.58 instructor factor.

                 Instructor Factors

                    L - 1.26
                   PE - 4.80
                   E - 2.58

---

   *Of the 130 lecture hours, 113 require only 1 instructor per POI-hour,

  and 17 require 3 instructors per POI-hour.

Platform Factor.

This factor actually represents a relationship between the number of hours an instructor can teach per day for a given course of instruction, and the total number of teaching hours available per day. In certain POI subjects one instructor may be capable of teaching 6 hours per day without losing his effectiveness. There are other situations (such as teaching difficult technical subjects) where as little as 3 hours on the platform per day is considered an optimum workload. If it is determined that due to the complexity of the material being presented, an instructor can teach 6 hours per day and there are 8 hours available per day, the platform factor is 8 divided by 6 or 1.3.

Recapitulation by Security Classification: Reflect the total number of hours within each security classification.

Summary:

1. Academic Time. Reflect only that time utilized in an instructional mode. Separate entries will be made for MOS supporting and common subjects, non-MOS supporting.

2. Non-academic Time. The Director, Office of Plans and Programs provides authorized times for each of the categories based on the academic time requirement as shown in format example.

SECTION II - JOB PERFORMANCE REQUIREMENTS

The duties, tasks, and elements of the overall field job requirements are enumerated in behavioral terms. The source of information for this section is the performance objective workcards developed from job analysis data and provided by the Evaluation Unit to the academic

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departments. Duties are identified by Roman numerals, tasks by capital letters, and elements by arabic numbers. Example: Duty I, Task B, Element 3.

> Note: For MOS 05K and 98C, only the title of the duties, tasks, and elements, which are based on first generation job analysis data, need be shown. Subsequent POI for these MOS's will express job performance requirements.

SECTION III - TRAINING PERFORMANCE OBJECTIVES

This section is a consolidation of the performance objectives as expressed in each of the course lesson plans in the sequence in which they will appear in the course of instruction. A columnar arrangement will be used as follows (see format example):

> Column 1 - Lesson Plan File No.
>
> Column 2 - Classification.
>
> Column 3 - LP Time, and Type Instruction. (The LP time may be shown in hours or minutes as appropriate for the particular POI. However, all time references should be consistent. If time is reflected in minutes for one LP, then all LP time allocations will be expressed in minutes.
>
> Column 4 - LP Title and Performance Objective. This relates what the student must be able to do as a result of receiving the instruction.
>
> Column 5 - Job References. Each lesson plan will be cross-referenced to the job requirements that are

supported by the lesson plan. References will be made by using the duty, task, and element identification as contained in section II (e.g., IIC2 - Duty II, Task C, Element 2).

Column 6 - Content References. Include any official publications, manuals, etc., which were used to develop the lesson content materials (e.g., OTD 10-4).

SECTION IV - PERFORMANCE EVALUATIONS FOR ....
(Use title of course.)

This section is intended to show the type and scope of measuring instruments that are used as the basis for determining student development and level of proficiency. Reference is to those evaluations developed by Evaluation and MOS Test Division (E&MT) which are administered at critical junctures during, and at the end of the course, which are used as "go" or "no-go" criteria. The individual lesson plan evaluations (department developed internal evaluations) need not be included. The arrangement of this section is columnar (see format example):

Column 1 - Evaluation Identification. The file number assigned to the evaluation.

Column 2 - Classification. Self-explanatory.

Column 3 - Strategy Used. Enter multiple choice, true-false, performance, etc., as appropriate.

Column 4 - Scope. Enter the lesson plan file numbers, the contents of which are included in the evaluation.

Column 5 - Time. Enter the time required to administer the evaluation.

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Column 6 - Week. Enter the week of training during which the evaluation is administered.

SECTION V - SEQUENCE OF INSTRUCTION AND CLASSROOM REQUIREMENTS

This section will list lesson plan file numbers and titles in the order in which they are introduced in the course. It is understood that some lesson plans cover large blocks of hours and will be interspersed throughout the course. The academic element may enter such a lesson plan each time it is used if considered appropriate to do so. The classroom/training area requirements for each lesson plan will be included and will show any special requirements. For example, an equipment lesson plan may require the use of a classroom that has a minimum number of a particular type of installed equipment.

ANNEX D

EXAMPLE OF POI FORMAT

Month Year

PROGRAM OF INSTRUCTION

FOR

POI NUMBER

MOS TITLE

MOS NUMBER

Length: Peacetime   - ____ weeks ____ days

         Mobilization - ____ weeks ____ days

TABLE OF CONTENTS

MOS Title - MOS Number

A. Course: (Enter number and title of the course.)

B. Purpose:

   1. Job Performance Objectives

      a. Behavior:

      b. Condition of Performance:

      c. Criterion of Performance:

   2. MOS for which trained (Enter title and MOS number.)

C. Prerequisites: (Enter aptitude and administrative prerequisites.)

D. Length: **Peacetime** **Mobilization**

              ____ Hours ____ Hours

              (Based on __ hours of instruction per week)

E. Training Location:

F. MOS Feeder Pattern:

   Prerequisite MOS MOS Trained in this Course Feeds Following MOS

G. Ammunition Requirements:

H. Common Subjects Recapitulation:

I. Standardization of Prefix Digit-5 Training:

J. Identification of Counterinsurgency Training:

K. Type of Academic Instruction and Instructor Factors:

   1. **Type of Instruction** **Hours**

      Lecture

      Conference

      Demonstration

Film

Practical Exercise

Programmed Instruction

Criterion Evaluation

2. Manpower Requirement Factors

    a. Instructor Factor:

       (List only those types of instruction utilized within the course.)

    b. Platform Factor:

L. Recapitulation by Security Classification: <u>Hours</u>

(List by category only those classifications used in the course. Nonacademic time will be included in the unclassified category.)

M. Summary:

1. Academic Time   <u>Hours</u>

    a. MOS Supporting:

    b. General Military:

2. Nonacademic Time   <u>Hours</u>
                      Peace/Mobilization

    a. Inprocessing:

    b. Outprocessing:

    c. Commandant's Time:

    d. Open Time:

    e. Physical Training:

SECTION II - JOB PERFORMANCE REQUIREMENTS
MOS Title - MOS Number

Duty I:

    Behavior:

    Condition:

    Criterion:

    ### Task A:

        Behavior:

        Condition:

        Criterion:

        ### Element 1:

            Behavior:

            Condition:

            Criterion:

        ### Element 2:

            Behavior:

            Condition:

            Criterion:

Duty II:

    Behavior:

    Condition:

    Criterion:

    ### Task A:

        Behavior:

        Condition:

        Criterion:

__Element 1:__

   Behavior:

   Condition:

   Criterion:

SECTION III - TRAINING PERFORMANCE OBJECTIVES
MOS Title - MOS Number

LESSON PLAN FILE NO.	CLASSIFI- CATION	LP TYPE AND TITLE	LP TITLE AND PERFORMANCE OBJECTIVE	JOB REFERENCES	CONTENT REFERENCES

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SECTION IV - PERFORMANCE EVALUATIONS FOR (Use Title of Course)
MOS Title - MOS Number

EVALUATION IDENTIFICA- TION	CLASSIFI- CATION	STRATEGY USED	SCOPE	TIME	WEEK

SECTION V - SEQUENCE OF INSTRUCTION AND CLASSROOM REQUIREMENTS
MOS Title - MOS Number

LESSON PLAN FILE NO.	LESSON PLAN TITLE	CLASSROOM REQUIREMENTS

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ANNEX E

EXAMPLE OF POI/LP CHANGE SHEET

DIVISION, DEPARTMENT
UNITED STATES ARMY SECURITY AGENCY TRAINING CENTER AND SCHOOL
Fort Devens, Massachusetts 01433

CHANGE NO. 1   Date _____
POI.LP NO. (Date)

POI/LP Title

Cited POI/LP will be changed as follows:

     1. Page 2. Remove page 2 and insert revised page 2.

     2. Page 5. Make the following pen-and-ink changes:

1 Incl   RICHARD J. CLARK
  Revised page 2   LTC, AIS
                                          Dir, Dept __

DISTRIBUTION:
    Tech Con
    Ch, Eval Unit
    Dir, Tng Lit
    Dir, Dept __ - 3 cy
      1 - Dept File
      1 - Instructor's File (LP only)
      1 - Monitor's Desk File (LP only)

POSTED:
      Date: _____   By: _____

(See instructions on next page.)

CHANGE SHEET INSTRUCTIONS

No changes will be made to an approved POI and LP unless a change sheet effecting such change has been issued.

    1. Changes to each document will be made by means of change sheets, numbered serially.

    2. Change numbers will be identified as follows:

        a. First - list the change number.

        b. Second - list the POI/LP number followed in parentheses by the date of the document.

    3. All change sheets must be dated to show the date that the change sheet was issued.

    4. Change sheets will be signed, personally, by the department director.

    5. Distribution of change sheets will be shown.

    6. Posted statement will be listed and will be completed by recipients of change sheets.

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CHAPTER 13

EVALUATING INSTRUCTIONAL SYSTEMS

A. INTRODUCTION

1. _Purpose_. All efforts up to this point have been focused on the preparation of plans and materials to conduct a course of instruction. Now the instructional system must be subjected to tryout and evaluation to determine the effectiveness of the system and each of its components in operation. Although conclusive proof of the adequacy of the system can only be obtained by followup and evaluation of graduates on the job, observation of the system in action can provide valuable data for improvement. The purpose of this chapter, therefore, is to identify precisely _what_ is to be evaluated, _who_ will do the evaluating, and _when_ and _how_ the evaluation is to be done.

2. _Components of a Learning Situation to be Evaluated_. A learning situation involves students, instructors, course content, sequence, time allocations, instructional strategies, materials, equipment, and facilities. If any one of these components is substandard, the instructional program cannot be maximally effective in achieving the desired goals.

   a. _Students_. Regardless of the skill with which an instructional system has been designed, the training program will fail unless the student input matches the target population of the system. All training courses have prerequisites. If students do not possess the prerequisite aptitudes, skills, and knowledges, they are not ready for the course as designed. They will not be able to acquire the job skills and knowledges the system aims to develop--at least not with the materials provided and within the time frame established. If it is discovered that the typical student does not measure up to the prerequisites set for a particular course, changes must be made in the course to accommodate the lower quality input, or the prerequisites themselves must be changed. Close study and observation of the pilot classes is therefore necessary to determine the compatibility of the input and the instructional system.

   b. _Instructors_. Even the best instructional strategy, facilities, equipment, and materials will fail to produce the required job skills if substandard instructors implement the program. The instructor is one of the key components of a training system. He must possess the technical and pedagogical knowledge and skills and be highly motivated if he is to be successful in using the strategies, materials, and equipment selected or produced during the system planning phase. By observing instructors as they work with the other system components, it is possible to get some leads as to possible deficiencies in the system. At least it will be possible to identify instances where the faulty part of the system is the instructor.

c. Course Content. The selection of course content is largely a judgmental procedure. Although in the final analysis, the adequacy of content taught, in terms of both amount and kind, can only be determined by evaluating the man on the job, much useful data can be gathered by listening and observing as the content is presented. During the development of instructional materials, every effort is made to avoid unnecessary duplication of content and conflicts in concepts and doctrine. However, discrepancies are bound to occur and these weaknesses must be identified and eliminated. Classroom observation is a means of doing this. In addition, the appropriateness and level of the content presented can also be judged by observing the students and the instructors as they work with the materials.

d. Sequence and Time Allocations. The only practical way to determine the correctness of the sequence of instruction and the time allotted to each block of instruction is to subject these elements of the system to actual trial. Students will quickly note blatant errors in sequencing because they will not possess the required learnings to deal with the new material. Instructors will easily note cases of improper time allocation when they attempt to cover the materials and develop the job knowledges and skills. The comments of both students and instructors, as well as the observations of an outside evaluator, will provide the data needed to improve both sequencing and time allocations.

e. Instructional Strategies. The most objective method of determining the optimum instructional strategy is to conduct experimental studies in which different strategies are compared. This is an expensive and time-consuming procedure. None-the-less, such studies will be conducted. But, the number of controlled studies that can be conducted is limited by personnel, time, and funds. For this reason, much of the initial data pertaining to the adequacy of the instructional strategy selected for presenting a block of instruction must be obtained by observation of the system in action. The judgments of qualified and trained observers will be used to collect these data.

f. Materials, Equipment, and Facilities. Judgments about the adequacy of materials, equipment, and instructional facilities can be made prior to the launching of instruction. However, to obtain valid judgments relating to the appropriateness of these system components, both in terms of kind and amount, requires observation of an on-going learning situation. Part of the job of an observer will be to note deficiencies in these areas and make recommendations for improvement.

3. Perspective Needed for Complete Evaluation. An instructional system can be evaluated from several different and complementary perspectives. Unfortunately, in the great majority of training programs, the only point of view represented is that of an outsider, a member of the staff or faculty, who is not directly involved in the learning situation. While this type of evaluation is necessary, it cannot provide complete data on the effectiveness and efficiency of the system. Two additional perspectives are needed: the observations and evaluation

by students and instructors, both of whom are integral parts of the learning situation. With careful planning and adequate controls, these groups can provide information and recommendations of great value in revising and improving an instructional system.

4. Pitfalls in Evaluation. Too often, programs of evaluation, based on observation and opinion surveys, have failed. Mainly these failures can be attributed to inadequate planning, lack of objectivity, improper interpretation of findings, and inappropriate use of results. Poor systems of evaluation produce anxiety, resentment, or efforts to sabotage the program. Here are some of the most common pitfalls in each of these categories.

a. Planning.
(1) Failure to work out the details of the program, to include data collection instruments, specific procedures to be followed, and the timing of observations, surveys, and interviews.
(2) Failure to train evaluators in the principles and techniques of evaluation, including the use of data-gathering instruments.
(3) Failure to make clear to all concerned the purposes of the evaluation program and the uses to be made of evaluations and recommendations.

b. Lack of Objectivity.
(1) Failure to select evaluators who are impartial and capable of making objective judgments.
(2) Failure to look at all of the components of the learning situation as an integrated system.
(3) Focusing on unimportant details and "nit-picking" instructors.

c. Improper Interpretation.
(1) Assuming that consensus among observers of one category (e.g., students) guarantees a valid judgment.
(2) Concluding that an observation or judgment made by only one observer is inaccurate or invalid.
(3) Taking comments at face value, and not considering the nuances of language, and the problem of semantics.
(4) Failing to take into consideration the perspective of the individual making the observation.

d. Inappropriate Use.
(1) Using reports of observation and evaluation as the basis for disciplinary actions.
(2) Using reports as a basis for denying promotion or special privileges.
(3) Using otherwise unsupported and unvalidated observations as a basis for making significant changes to an instructional system.

B. OBJECTIVES OF THE EVALUATION PROGRAM

1. _Primary Objective_. The primary and overriding objective of the program of instructional evaluation is to collect data which will serve as a valid basis for revising and improving instructional systems. The evaluation of instructors separately and distinctly from other system components is _not_ the objective. Instructors will be evaluated as one of the system components interacting with all of the others.

2. _Secondary Objectives_. There are several secondary objectives which an evaluation program must serve. These are as follows:
   a. To insure that instruction is conducted in a manner consistent with the system as designed. There must be some means of insuring that the system as observed is the same as that planned; radical departures from the planned system cannot be allowed because the validity and effectiveness of the system cannot be checked under these circumstances.
   b. To provide a basis for instructor inservice training and upgrading. An inservice or upgrading program for instructors must be based on observed needs. Data collected by qualified and objective observers can well serve to identify areas in which additional training for instructors can be scheduled.
   c. To provide data which are usable in effecting revisions of the Instructor Training Course. Objective observation can reveal _common_ deficiencies among instructors which can be remedied by changes in the Instructor Training Program.

C. PROCEDURES

1. _Training and Assigning Evaluators_.
   a. Evaluators assigned to the Evaluation Unit (EU) will undergo special training in the techniques of observation prior to making evaluation visits. This training will be provided by Chief, Evaluation Unit.
   b. Evaluation of specific courses of instruction will be performed by those evaluators who performed the job analysis of the MOS concerned. They may request the assistance of other members of the staff when needed.

2. _Briefing Students and Faculty_.
   a. Chief, Evaluation Unit will provide separate briefings for students in each pilot course and for personnel who will instruct in these courses.
   b. The briefings will define the purposes of the evaluation program, responsibilities, specific procedures to be used (including the data gathering instruments), pitfalls to avoid, and the uses to be made of the reports rendered.

3. Scheduling.
    a. Classroom Observation.
        (1) Evaluators (EU) will observe as many classes as possible during the conduct of each pilot course. As a minimum, at least 25 per cent of all classes will be evaluated.
        (2) In preparing for evaluation, evaluators will insure that all critical points in the instructional sequence are observed and that an adequate sample of all other instruction is included.
            (a) "Critical points" are defined as points in the instruction where students perform some important job task or element of skill which is judged as go or no-go.
            (b) An "adequate sample" of other instruction is defined as enough additional observation of day-to-day instruction to obtain a clear picture of the interactions of all system components leading up to the critical performances.
    b. Student Opinion Surveys.
        (1) At the conclusion of selected blocks of instruction, Chief, Evaluation Unit will administer a student opinion survey to the pilot class using the instrument shown at annex A.
        (2) Additional opinion surveys may be made of shorter blocks of instruction on request of the Director of Instruction. The standard form at annex A may be used or special forms may be prepared if required.
    c. Student Interviews.
        (1) During the progress of each pilot course, evaluators (EU) will conduct interviews with a random sample of 10 per cent of the class enrollment using the form at annex B to report results.
        (2) Interviews may also be scheduled by the Academic Department Director. The standard form at annex B may be used to report results.
    d. Instructor Surveys.
        (1) At the conclusion of selected blocks of instruction, Chief, Evaluation Unit will administer the form at annex A to all personnel who conducted instruction in that instructional unit.
        (2) Additional instructor surveys may be administered upon request of the Director of Instruction.
    e. Instructor Interviews.
        (1) At the conclusion of selected blocks of instruction, Chief, Evaluation Unit will conduct interviews with the senior instructor of each academic element involved and report results on the form shown at annex B.
        (2) Additional instructors may be interviewed on request of the Division Chief concerned, again using the standard form for reporting purposes.

4. Techniques of Classroom Observation. Evaluators will:
    a. Review the lesson plan and supporting materials prior to arrival in the classroom or training area.

b. Arrive in the classroom or training area before instruction begins and remain long enough to get a clear picture of the learning situation.

c. Make every effort to avoid being a distraction to either the instructor or the students.

d. Refrain from commenting on either content or procedures during the presentation.

e. Guard against display of disagreement, displeasure, or boredom by facial expression, gestures, or posture.

f. Convey an attitude of interest, attention, and objectivity.

g. Focus their attention on each component of the learning situation but pay particular attention to student reaction.

h. Complete the evaluation form (see Annex A) immediately after the visit.

5. <u>Techniques of Interviewing</u>. Interviewers will:

a. Allow a minimum of 30 minutes for each interview.

b. Review the records of the interviewee prior to the meeting.

c. Conduct the interview in a place that is private and free from the distractions of noise and interruptions.

d. Establish a friendly, cooperative, working relationship with the interviewee.

e. Deal with the interviewee in a forthright sincere manner and listen attentively to his comments.

f. Avoid evidences of pressure, boredom, and irritation; be patient.

g. Avoid antagonizing, embarrassing, or hurrying the interviewee.

h. Display an objective but not a disinterested attitude.

i. Accept, unperturbed, expressions of negative feelings, such as hostility and highly subjective criticism.

j. Encourage the interviewee to state his views completely and without fear of censure or reprisal for honest criticism.

k. Raise questions to elicit responses about areas not covered in the interviewee's comments; e.g., adequacy of classroom facilities, scheduling, equipment, etc.

l. Summarize the main points made to be certain that he has a clear and complete picture of the interviewee's observation and evaluation.

m. Complete the interview form immediately following the interview.

6. <u>Instructor Evaluation</u>.

a. At the conclusion of selected blocks of instruction, Chief, Evaluation Unit will distribute copies of the questionnaire at annex B, to all instructors who conducted instruction during the instructional unit.

b. Instructors will complete the form and return it to Chief, Evaluation Unit.

c. Followup interviews with instructors will be coordinated with the Department Director concerned and with the Director of Instruction. Such interviews will be conducted by the EU evaluator designated as project officer for the MOS course concerned.

d. Reports of interview will be prepared in the format shown at annex B.

7. Student Evaluation.

a. At the conclusion of selected blocks of instruction, Chief, Evaluation Unit will distribute copies of the questionnaire at annex A to all members of the pilot class.

b. Students will complete and sign the forms and return them to Chief, Evaluation Unit.

8. Tabulating, Interpreting, and Reporting Survey and Interview Results.

a. Student opinion and instructor surveys will be forwarded to Chief, Evaluation Unit for tabulation, analysis, interpretation, and reporting.

b. Student and instructor interview forms will be forwarded by interviewers to Chief, Evaluation Unit for analysis, interpretation, and the preparation of a summary report.

c. Reports of observations of classroom instruction will be forwarded to Chief, Evaluation Unit for tabulation, interpretation, and preparation of summarizing reports.

9. Routing and Distribution of Reports. Copies of reports of observation, evaluation and interview, complete with recommendations will be distributed as follows:

a. Evaluation Unit file - original.

b. Director of Instruction - one copy.

c. Director, Monitoring Department - one copy.

d. Chief, Monitoring Division - one copy.

e. Director, Instructing Department (if different from monitor) - one copy.

f. Chief, Instructing Division (if different from monitor) - one copy.

g. Technical and Educational Consultants - one copy (info).

10. Intradepartmental Instructional Evaluation Program.

a. The Director of Instruction will initiate and supervise a revitalized program of intradepartmental instructional evaluation.

b. Chief, Instructional Methods Division will develop and conduct a training program designed to prepare departmental supervisory personnel (officers, NCO's and civilians) for the evaluation of instructional systems using the techniques of observation and interviewing prescribed herein.

c. Department Directors will schedule and conduct observations and interviews as directed by the Director of Instruction.

d. Observations and interviews will be conducted by departmental supervisory personnel in accordance with the procedures and standard forms prescribed in this chapter.

e. Reports of observation and interview will be distributed as directed by the Director of Instruction.

REPORT OF EVALUATION

Course _____   Date _____

Instructional Unit   _____.____   Instructional Unit _____
        or   or
Lesson Plan No.   _____   Lesson Plan Title _____

Department _____ Division _____   Instructor _____

Directions: For each item listed below, circle the word which
best describes your evaluation of the system com-
ponent or characteristic. Explain in the Remarks
Section, all items circled in columns 1 and 2.

Item	1	2	3
1. Students' aptitude for the instruction	Lacking	Questionable	Adequate
2. Students' readiness for the instruction (in terms of background and experience)	Lacking	Questionable	Adequate
³. Students' motivation and interest	Lacking	Questionable	Adequate
4. Instructor's knowledge of subject-matter	Inadequate	Questionable	Adequate
5. Instructor's teaching skills	Inadequate	Questionable	Adequate
6. Relationship between content and objectives	Inconsistent	Questionable	Consistent
7. Accuracy of content	Inaccurate	Questionable	Accurate
8. Level of instruction	Inappropriate	Questionable	Appropriate
9. Sequence of instruction	Inappropriate	Questionable	Appropriate

ANNEX A (cont)

REPORT OF EVALUATION

Item	1	2	3
10. Time allocation	Improper	Questionable	Proper
11. Instructional strategy	Inappropriate	Questionable	Appropriate
12. Instructional materials	Unsuitable	Questionable	Suitable
13. Instructional equipment	Inadequate	Questionable	Adequate
14. Classroom facilities	Inadequate	Questionable	Adequate

REMARKS

Item No.	Description of Deficiency	Recommendation

ANNEX B

REPORT OF INTERVIEW

Name _____   Date _____

Course _____   Instructional Unit _____

Department _____   Division _____

COMMENTS

Student Input

Instructors

Course Content

Sequence/Time Allocations

Instructional Strategies

Materials, Equipment, and Facilities

_____
Interviewer

Inclosure 2

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CHAPTER 14

ANALYZING AND USING TEST RESULTS

A. INTRODUCTION

1. Purpose. An earlier chapter of this manual described the construction of criterion measures. It will be recalled that, during the development of the instructional system, the purpose of criterion measures (internal and MOS qualification) is primarily to determine the adequacy of the system and only secondarily to evaluate students, diagnose learning difficulties, and to serve other training purposes. However, when the instructional system has been validated, criterion measures are then used to evaluate the training product. It was also emphasized that criterion measures must be constructed directly from the performance objectives and that the student must demonstrate his ability to meet or exceed the prescribed standard for each of the training objectives. The purpose of the present chapter is to describe the procedures to be used in analyzing and using criterion test results.

2. Testing Considerations.
a. Meaning of Tests and Measurements. Human behavior varies in many ways. For example, there is a great variation in the speed and accuracy with which different individuals perform the same tasks. Numerical values can be assigned to a continuum representing the range of human behavior in any category. Discrete descriptions of behavior at any point along the continuum provide a standard against which observed behavior can be compared. Measurement is the use of numbers to compare observed behavior with such standards. Measurement is obtained by tests. A test is a means of observing how people perform in a specific, controlled situation. The test sets the tasks, and numerical values are used to show how well the students perform the tasks.

b. Tests as Tools. Tests cannot stand alone from other elements of the instructional system. If they are to be truly effective, they must contribute directly, systematically, and continuously to the achievement of the objectives of the system. Criterion tests must, therefore, be viewed as tools in a training program, one of the means used to achieve the training objectives, and not as an end in themselves.

c. Essential Characteristics of a Test. As indicated previously in this manual, criterion tests must meet certain standards. Specifically, every test must be valid, reliable, objective, and standard. All tests meet these requirements to a degree. No test is completely valid or completely invalid; nor is any test completely reliable or completely unreliable. It is also important to remember

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that all of the characteristics of a good test are closely related, and their effects are interwoven. Although all characteristics of a test are important, validity is the most critical feature because it is related to the purpose of the training. Test analysts must carefully consider whether a criterion test actually measures what it was designed to measure. If it does not, perfection of the other characteristics is meaningless. The major effort in test construction and test analysis must, therefore, be directed at insuring the validity of the test.

     d. <u>Performance Tests</u>. Most of the criterion measures used in instructional systems are true performance tests. They are instruments which require the trainee to demonstrate some operation or skill which is an essential part of a job. Usually, some type of equipment or apparatus is involved. The performance of the trainee is observed and evaluated in accordance with some <u>predetermined</u> standard of performance or product of performance. Performance tests are more likely to be valid because they consist of samples of behaviors essential to job, duties, or tasks.

     e. <u>Conventional vs Criterion Test Discrimination</u>. Achievement tests customarily used in training programs are constructed in such a way as to detect small differences in achievement. To obtain this result, tests are designed with these objectives in mind:

        (1) To produce a wide range of scores.

        (2) To include items at all levels of difficulty.

        (3) To insure that enough difficult items are included to prevent the test from being "broken" (some trainee obtaining a perfect score).

        (4) To make certain that each item differentiates between low and high scorers on the total test. In other words, in most situations tests are constructed so as to achieve a spread of scores which is consistent with the normal bell shaped distribution curve. A "good" conventional test, therefore, has a mean or average performance which permits "breaking up" the extremes of the population tested. A test with a range of performance between 40 and 80 percent correct is acceptable. To achieve this standard, the same requirement is imposed on test items. An item with a difficulty (percentage of students answering an item correctly) between .40 and .80 is considered acceptable. But, such items have to discriminate; that is, they must show a difference in performance between high- and low-scoring trainees. With the criterion measures of performance type tests, these considerations <u>no longer</u> apply. A criterion test represents a critical job performance. Each test, part of a test, or test item must be completed successfully in accordance with the prescribed standard. The average difficulty of these tests must be set at or near 1.00. Because <u>all</u> students must perform at the established level, discrimination indices for criterion tests and test items have no significance. However, the underlying basis for the concept of discrimination is adequately controlled by the go/no-go criterion.

B. USES OF TEST RESULTS

1. Ǧeneral. Test results may serve a variety of purposes.
Generally, they can and should perform more than one function in a train-
ing program. Priorities must be determined according to importance.

2. Ǧategories. In the USASATC&S, the uses of test results may be
cataloged under three headings: appraisive, instructional, and adminis-
trative. These uses, while not always considered as separate and dis-
tinct, are defined and discussed separately to develop a clearer under-
standing of each.

a. Appraisive. The staff and faculty of the School need
specific information regarding the quality of the instructional system
and its effectiveness in attaining the objectives. This is the basic
requirement -- the one with the highest priority. In addition, there
is a need for estimating the quality of the measuring instrument itself
so that actions based on the measures will be valid. Lastly, there is
a need for measures of group and individual student achievement/
performance upon which to base administrative and instructional actions.
The data derived from test analysis must be used to serve these pur-
poses:

(1) Determining the effectiveness of the instructional
system, to include the content, sequence, strategy, instruction, train-
ing equipment, training aids, and instructional materials and facilities,
in attaining the objectives.

(2) Estimating the effectiveness of the test in measuring
student achievement.

(3) Measuring how much a student knows about a job and
how well he can perform it.

b. Instructional. Another important use of criterion meas-
ures is to provide the instructional system planners and instructors
with the data needed to improve the system, its components, and its
products. Specifically, analysis of test results can be used to:

(1) Motivate students to learn as much as they can in
the shortest possible time.

(2) Identify groups and individual students requiring
remedial instruction.

(3) Achieve minimum and uniform standards of performance.

c. Administrative. Criterion measures must provide a sound
basis for taking certain administrative actions. Among the more impor-
tant are the following:

(1) Counseling deficient students.

(2) Recycling students in accordance with Agency require-
ments and student needs.

(3) Eliminating incompetent students.

(4) Assigning graduates to duty stations in accordance
with Agency requirements and student capabilities.

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C. STATISTICAL ANALYSIS

1. **Types of Statistics**. Assume that test construction has been completed in response to a requirement. It is necessary, therefore, to determine whether the tests meet the specifications. The simple question is, "How well does the test work?" Statistical analysis of test results provides an important measure of the effectiveness of a test. Two types of statistics are germane: (1) overall test statistics to include measures of central tendency, measures of test variation, measures of reliability, and measures of difficulty; and (2) test item statistics such as graphic item counts (GIC), measures of difficulty, and measures of discrimination.

2. **Overall Test Characteristics**.
   a. **The Mean**. The mean score is a measure of location or central tendency. It indicates how the typical individual in a group performed on the test. The mean is the average score and is computed by adding the scores and dividing by the number of scores. Because criterion tests are designed to test only **essential** knowledge and skills, the mean must be at or near the maximum possible score. Otherwise, there is a fault in the test or in the instructional strategy. However, because of the inescapable matter of human error, or an occasional poorly motivated student, the mean score may be lowered appreciably by one or two radically different scores. For this reason, a second measure of central tendency must be calculated.
   b. **The Median**. This is the score which divides all scores on a test into two equal parts; that is, the median is the middle score in a group of scores arranged in the order of magnitude. This score is less affected by extremely low or high scores and provides a better measure of test effectiveness. For the same reasons that the mean on a criterion test must be at or near the level of mastery, so must the median score approach 100 percent.
   c. **Measures of Variation**. It is not enough to know the typical score on a test because two groups of trainees may have the same or similar means, but the spread, scatter, variability, or deviation of the scores around the average is usually different. The range and the standard deviation are commonly used to show this spread.
   (1) The range is the distance from the highest to the lowest score in a series of scores. On a criterion test the range should approach zero but can easily be sizeable if only one man fails to perform satisfactorily.
   (2) The standard deviation is derived by mathematical formula from either a frequency distribution or ungrouped data, and shows how the scores spread around the mean score. On a criterion test, an extremely narrow standard deviation, approaching zero is the ideal. That is, the shape of the curve representing the results of a criterion measure should be leptokurtic in the extreme.

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d. <u>Measures of Reliability</u>. Certain statistical measures are used to estimate how consistently a test measures the ability or knowledge it is intended to measure. These statistics provide the test writer with one basis for judging the worth of a test and determining how much confidence he can place in its results.

(1) The coefficient of reliability may be determined by the "split-half" method. It provides an index of the consistency of the measurement. This index should approximate +1.00.

(2) The standard error of the mean/measurement provides an estimate of the accuracy (or inaccuracy) of measurement on a given test. This index should approximate zero.

e. <u>Mean Difficulty</u>. The mean difficulty of a test is an index of the overall difficulty of the test items that comprise the measure. It is calculated by finding the average difficulty of all test items. For a criterion measure, the mean difficulty should be between .90 and 1.00.

3. <u>Test Item Characteristics</u>.

a. <u>Item Difficulty</u>. The percentage of testees answering a given item correctly is the difficulty of the item. An item having a difficulty of .30 is a hard item; one having a difficulty of .90 is an easy item. As with mean difficulty, a derivative of item difficulty, item difficulty should be at or near 1.00.

b. <u>Discrimination</u>. As previously discussed in this chapter, discrimination indices for tests and test items have no significance when applied to criterion tests. Acceptability of demonstrated performance is adequately controlled by the go/no-go criterion.

c. <u>Graphic Item Counts (GIC)</u>. Where a test involves alternative answers, a count of the number of students selecting each alternative may be made. This is called a graphic count (GIC). The GIC can be used to analyze individual test items to determine where the student or a subgroup of students went wrong. These data can be used as a basis for revising the test or for providing remedial instruction.

D. PROCEDURES

1. <u>Statistical Analysis</u>.

a. Following the administration and scoring of criterion measures, Chief, Evaluation and MOS Testing Division will perform statistical analysis of the test and provide to Chief, Evaluation Unit the following data:

(1) The mean and median scores.

(2) The range and standard deviation.

(3) An index or indices of test reliability.

(4) The standard error of the mean and the standard error of measurement.

(5) The mean difficulty of the measure.

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(6) A breakout of test item difficulties.

(7) A graphic item count, if applicable.

b. Upon receipt, Chief, Evaluation Unit will analyze the statistical data and prepare a report of findings and recommendations which will be routed to the Chief, Evaluation and MOS Testing Division, Director of Instruction, and Director, Academic Department concerned.

2. <u>Use of Analysis</u>.

a. Director, Academic Department concerned, upon receipt of test data and class rosters, will

(1) Initiate actions to make changes in the instructional systems as indicated in the report of the Chief, Evaluation Unit. Assistance and coordination will be provided by the Evaluation Unit evaluator assigned to the course as project officer.

(2) Initiate counseling/recycling/remediation/elimination actions as indicated by group and individual student performance on the test.

(3) Assist the Chief, Evaluation and MOS Testing Division in revising criterion measures as required.

b. Chief, Evaluation and MOS Testing Division, upon receipt of report from Chief, Evaluation Unit, will initiate action to revise the criterion measure as required, following the procedures defined in a previous chapter of this manual.

CHAPTER 15

FOLLOWING-UP GRADUATES

A. INTRODUCTION

1. <u>Purpose</u>. All efforts in the development of an instructional system up to this point have been directed toward the production of personnel technically qualified to perform the duties of their MOS in field units. The real proof of the system is the school graduate's ability to perform adequately on the job. To determine the effectiveness of the instructional system, and to provide a basis for revising and improving it, objective data pertaining to the on-the-job performance of personnel exposed to the system must be collected. The purpose of this chapter is to identify the kinds of data needed, the means to be used in collecting these data, and the specific procedures to be followed in gathering the required information.

2. <u>Objectives of the Followup Program</u>. The primary objectives of the followup program are to provide detailed information pertaining to the quality of the job performances of school graduates and to update job data. That is, all followup methods will be designed to identify specific weaknesses of graduates of the system and to recheck the list of job duties, tasks, and elements gathered by the job analysis teams.

3. <u>Uses of Followup Data</u>: Data collected by means of the followup program will be used by:
   a. Curriculum builders to modify the objectives, content, sequence, emphases, and time allocations of instructional systems.
   b. Instructors to adapt instructional strategies so as to remedy deficiencies uncovered.
   c. Testing personnel to modify criterion measures used in evaluating student achievement, to validate MOS qualification tests, and to revise tests produced for use in the DA MOS Evaluation Program.

4. <u>Methods of Collecting Data</u>. There are several complementary methods of collecting followup data. At one time or another, all methods will be used.
   a. <u>Field Evaluation Followup Teams</u>. The most reliable sources of data on how well the product of the instructional system performs his duties are the graduate himself, his immediate supervisor, other supervisory personnel, and field unit commanders. This fact dictates the establishment of followup field evaluation teams. These teams are selected and trained to perform field evaluation followup using standardized and validated interview and observation procedures

and techniques, and associated data-collection instruments. This method is the primary means of collecting evaluation data. It involves observation and interview of graduates of the system on the job and interviews with supervisory personnel (trick chiefs, NCOIC's, OIC's and operations officers) and unit commanders.

      b. Secondary Methods. The following secondary methods of collecting data pertaining to the quality of the performance of school graduates will be used to complement the field evaluation followup teams.

      (1) Analysis of DA MOS Tests. Review and analysis of tests administered to school graduates in connection with the DA MOS Evaluation System can provide data pertaining to their strengths and weaknesses.

      (2) Interviews with officer and NCO field returnees. Officers and NCO's assigned or TDY to HQ, USASA or to the USASATC&S following overseas tours of duty with ASA units can provide valuable data relating to the performance of the graduate and his strengths and weaknesses. Full advantage must be taken of these data collection opportunities.

      (3) Reports of HQ, USASA and NSA. HQ USASA and NSA staff sections, as recipients of the products produced by graduates of the system, can provide valuable data relating to the adequacy of the training program.

      c. Alternative Method. During periods of austerity, resulting in nonavailability of funds or personnel required to support field evaluation visits, questionnaire surveys may be used to collect evaluation data. Questionnaires will be designed to elicit specific information, relating to the strengths and weaknesses of graduates of the system, from the graduates themselves, their immediate supervisors, other supervisory personnel, and unit commanders.

B. FIELD EVALUATION FOLLOWUP TEAMS

    1. Mission. The mission of the Field Evaluation Followup Teams is to:

      a. Collect, record, and report deficiencies in knowledge and skills displayed by graduates of the instructional system assigned to TDA/TOE positions in ASA units.

      b. Collect, record, and report suggestions made by personnel at field units to improve specific instructional systems.

      c. Collect, record, and report changes in the duties, tasks, and elements of an MOS, shifts in emphases, and changes in equipment, procedures, and techniques.

    2. Composition. Field evaluation followup will be performed only by careful selected military and civilian personnel who have been trained for the conduct of followup observation and interview. Team members may be drawn from any element of the USASATC&S staff and faculty.

3. _Training._ A formal course of instruction, designed to prepare selected members of the staff and faculty to perform field evaluation followup, will be designed and presented by Chief, Evaluation Unit as required.

C. PROCEDURES FOR THE CONDUCT OF FIELD EVALUATION FOLLOWUP

1. _Planning Steps._ The team chief with the assistance of team members will:

 a. Identify the specific class or classes to be followed up.

 b. Identify the specific units to which graduates of the class have been assigned.

 c. Select units to be visited which --

  (1) Are representative in terms of major ASA missions; e.g., strategic/tactical, fixed/semifixed/mobile.

  (2) Reflect "typical" job requirements of the job Development System being studied.

  (3) Are geographically/environmentally representative.

 d. Notify units of the purpose, time, and duration of visits.

 e. Review documents relating to --

  (1) The mission, organization, and capabilities of units to be visited.

  (2) Equipment authorization for units to be visited.

 f. Review job analysis schedules produced by USASA Command Job Analysis Teams.

 g. Review existing Army Regulation Job Description.

 h. Prepare and rehearse standard briefing for:

  (1) Theater commanders.

  (2) Unit commanders.

  (3) Supervisory personnel.

  (4) School graduates.

 i. Develop detailed procedures and materials for the conduct of observations and interviews.

 j. Dry-run procedures.

2. _Conduct of Field Evaluation Followup at Units._ The team chief, assisted by team members, will:

 a. Brief commanders on purposes, procedures, and requirements, including:

  (1) Why the followup is being performed.

  (2) What the team requires in the way of assistance and support.

  (3) How the team plans to conduct the followup.

  (4) How the followup data will be used.

b. Study the mission, organization, and functions of the unit.

(1) Study organizational charts and discuss with supervisory personnel to determine their accuracy in terms of the "real" operational structure.

(2) Study local directives, instructions, and SOP governing unit operations. Pay particular attention to documents which relate to the MOS under consideration.

c. Brief supervisory personnel on the purpose and procedures of the followup.

(1) Include the same information provided the commander.

(2) Specify the assistance required.

(3) Set up a definite time for interviews.

d. Review the records of graduates to be interviewed and observed, and note pertinent data on followup forms.

e. Brief graduates on the purposes and procedures of the followup.

(1) Include pertinent items from the standard briefing.

(2) Set a definite time for interview and observation.

(3) Ask the graduate to do some preliminary thinking about his duties and how well he performs them.

f. Interview supervisory personnel.

g. Observe the graduate on the job.

h. Interview the graduate.

i. Cross-check discrepancies between the graduates' responses and supervisor's responses with immediate supervisor.

j. Interview CO/Opns officer.

k. Conduct interviews using the following techniques:

(1) Allow minimum time for interviews as follows:

(a) Supervisory personnel - 1 hour.

(b) Graduates - 1 hour.

(c) Operations officers and CO's - 30 minutes.

(2) Establish rapport before getting on with the business of the interview.

(3) Conduct the interviews in a place that is private and free from distractions.

(4) Establish a friendly, cooperative working relationship with the interviewee.

(5) Deal with the interviewee in a forthright, sincere manner, and listen attentively to his comments.

(6) Avoid evidences of pressure, boredom, or irritation; be patient.

(7) Avoid antagonizing, embarrassing, or hurrying the interviewee.

(8) Display an objective but not a disinterested attitude.

(9) Accept, unperturbed, expressions of negative feelings, such as hostility and highly subjective or destructive criticism.

(10) Encourage the interviewee to state his views completely and without fear of censure or reprisal for honest criticism.

(11) Cover all points on the standard interview form and make all entries required.

(12) Summarize the main points to be sure that you have a clear and complete picture of the interviewee's observations and evaluations.

(13) End the interview when the interviewee can no longer give you pertinent and usable information.

1. Observe the graduate perform the duties and tasks of his MOS.

(1) Observe long enough to see performance of all major duties.

(2) Ask questions only when necessary.

(3) Make notes of your observations.

m. Provide an exit briefing for the unit commander.

(1) Summarize your findings by MOS.

(2) Provide the commander with an opportunity to make additional comments and recommendations.

3. Postvisit Activities.

a. Team chiefs, assisted by team members, will consolidate and tabulate collected data and forward to Chief, Evaluation Unit.

b. Chief, Evaluation Unit will:

(1) Analyze the data.

(2) Prepare a report and submit the report for comment to --

(a) Educational Consultant.

(b) Technical Consultant

(c) Director of Instruction

(d) Director, Responsible Academic Department.

(3) Upon receipt of comments, make required changes in the Performance Objective Workcards using procedures described in chapters 3 and 4 of this manual.

(4) Coordinate required changes in criterion measures, course content, sequencing, and time allocations, instructional strategies, equipment and instructor requirements, course prerequisites, and instructional materials. These changes will be effected by the responsible academic or staff element in accordance with the procedures defined in the appropriate chapter of this manual.

D. PROCEDURES FOR USING
SECONDARY METHODS OF FOLLOWUP

1. Analysis of DA MOS Evaluation Tests.

a. Following the administration and scoring of DA MOS evaluation tests, Chief, Evaluation and MOS Test Division will:

(1) Obtain complete statistical data for the test from CO, US Army Enlisted Evaluation Center.

(2) Identify and tabulate distributions of scores for personnel exposed to the new instruction system.

(3) Perform an analysis of test results to identify specific weaknesses of school graduates on the test.

(4) Prepare a report of findings and recommendations and route copies for comment in turn as follows:

(a) Technical and Educational Consultants.

(b) Director of Instruction.

(c) Director, Responsible Academic Department.

(d) Chief, Evaluation Unit.

b. Upon receipt of comments, Chief, Evaluation Unit will coordinate necessary changes in the system as proscribed in the appropriate chapters of this manual.

2. Interviews with Field Returnees.

a. Policy. All newly assigned USASATC&S officer and NCO personnel returned from oversea assignments will be interviewed regarding technical, doctrinal, tactical, or operational matters which pertain to any mission of the US Army Security Agency. Written records of all interviews will be kept. Information obtained will be supplied to staff and academic elements of USASATC&S. This information will be screened, evaluated, and where appropriate, promulgated in training literature and academic instruction.

b. Procedures.

(1) The Director of Personnel and Administration will, on Wednesday of each week, provide the names of all newly assigned personnel to the Office of Training Literature.

(2) The Director, Office of Training Literature will:

(a) Interview all newly assigned personnel and keep written or taped records of each interview, to include, but not be limited to, the following items:

1. Name, rank, service number, MOS, previous unit and duty assignment.

2. Technical, doctrinal, tactical, and operational information.

3. Specific details of any unusual or special activity or information.

4. Information regarding whether training received before going overseas was sufficient to accomplish his assigned tasks; if not, the specific deficiencies will be recorded.

(b) Send requests to other ASA units for followup information on items deemed worthy of additional study.

(c) Develop a standardized briefing form to include pertinent specific requests for information suggested by staff and academic elements.

(d) Refer the person being interviewed to other staff or academic elements of the USASATC&S for additional interviews upon request from the staff or academic element concerned. In such cases, a representative from the Office of Training Literature will accompany the person being interviewed and will remain present during

the interview. This procedure is necessary to:

    1. Avoid useless duplication with the accompanying loss of time and inconvenience to the interviewer and to the person being interviewed.

    2. Insure that all pertinent information obtained from the person is permanently recorded and retained by the Office of Training Literature.

    (e) When appropriate, summarize and forward to HQ, USASA information obtained from interviews. If the person interviewed must report to higher headquarters for additional debriefing, a request for a recorded copy of this debriefing will be initiated and sent by the Office of Training Literature to the headquarters concerned.

    (f) Route a copy of the written summary of each interview to the Assistant Commandant; Technical Consultant; Educational Consultant; Chief, Evaluation Unit; CO, USASATR; Director of Instruction; Director, Personnel and Administration; Director, Plans and Programs and Director, Logistics.

    (3) Each staff and academic element to which written records of interviews are sent will:

    (a) Review them and request the Director, Office of Training Literature to make arrangements for any further interviews required by them.

    (b) Assist the Office of Training Literature to obtain and record accurate, concise and complete summaries of all pertinent technical, doctrinal, or operational information obtained from personnel being interviewed.

    (c) Evaluate and report to the Chief, Evaluation Unit and Office of Training Literature its determination of the usefulness and validity of all information obtained from the person being interviewed.

    (d) Submit to the Director of Training Literature special requests for information concerning items about which they require explanation or clarification.

    (4) Recommendations for changes to the system, if indicated, will be submitted through Chief, Evaluation Unit for staffing with academic and staff elements as noted in paragraph D1(4) above.

    (5) Upon receipt of comments, Chief Evaluation Unit will coordinate necessary changes in the system as prescribed in the appropriate chapter of this manual.

3. __Reports of HQ, USASA and NSA.__

    a. As required, but at least annually, Chief, Evaluation Unit will solicit the comments of chiefs of appropriate staff sections at HQ, USASA and NSA regarding the quality of materials and reports submitted by ASA operating units. These comments may be obtained by questionnaires or visits.

    b. Reports of findings and recommendations will be routed for comment as indicated in paragraph E1(4) above.

c. Upon receipt of comments, Chief, Evaluation Unit will coordinate necessary changes in the system as prescribed in the appropriate chapters of this manual.

E. PROCEDURES FOR CONDUCTING QUESTIONNAIRE SURVEYS

1. Conditions of Use. Questionnaire surveys for the followup evaluation of graduates of pilot courses will be used when shortages of funds or personnel preclude the conduct of field evaluation followup visits. Questionnaire surveys may also be used for collecting additional data on specific programs of instruction.

2. Types of Questionnaires. Questionnaires will be prepared by Chief, Evaluation Unit for each program of instruction. Separate questionnaires will be designed for graduates of the system, their immediate supervisors, and unit commanders (or operations officers).

3. Format and Content of Questionnaires.
a. Questionnaires will be designed to permit machine tabulation of responses wherever possible.
b. Questionnaires will include a complete breakout of the duties, tasks, and elements of the job being evaluated.
c. Space will be provided for indicating whether or not the duty, task, or element is performed, the frequency of performance, the importance of the duty, task, or element, the quality of the graduate's performance, and comments and recommendations of the respondent.

4. Sampling. All members of a pilot course, and their supervisors will be surveyed. In the case of special surveys, a sample of 20 per cent of the graduates of the year preceding the survey will be considered adequate.

5. Tabulation and Reporting.
a. Chief, Evaluation Unit will analyze the summary and prepare a report, with recommendations for changes to the system, and forward to the following for comment:
(1) Technical and Educational Consultants.
(2) Director of Instruction.
(3) Director, Responsible Academic Department.
b. Upon receipt of comments, Chief, Evaluation Unit will coordinate required changes in accordance with procedures defined in the appropriate chapters of this manual.

ANNEX A

INTERVIEW FORM

SUPERVISORS

Unit Identification _____

	Circle			
Interviewee _____	One	OIC	NCOIC	TC

Name of Graduate _____ MOS _____

1. In comparison with other men in this MOS of the same grade and experience, how do you rate this graduate?

   Circle One: Outstanding   Above Average   Average   Below Average   Unsatisfactory

2. Rate this man's performance on each of the following job tasks/elements and identify specific deficiencies in knowledge or skill.

Job Tasks/Elements	Rating				N/A	Deficiencies
	E	G	F	P		
1.						
2.						
3.						
4.						
5.						

3. What can the School do to improve training in this MOS/

4. Other comments?

                                           Interviewer _____

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INTERVIEW FORM

GRADUATES

Unit Identification _____MOS_____

Name of Interviewee _____Grade _____

Rank in Grad Class _____Supervisor's Rating _____

1. How many weeks elapsed from the time you graduated and the date you reported for duty? _____ weeks.

2. How many days of OJT did you have before being placed on position? _____ days.

3. How long have you been on position? _____ weeks.

4. Code speed (for MOS 05D, 05G, 05H, 05K only).

   a. Code speed upon graduation? _____ GPM

   b. Code speed on arrival and prior to OJT? _____ GPM

   c. Days required to get to position code speed? _____ days

   d. Present code speed? _____ GPM

5. Rate yourself on each of the job tasks or elements in this list.

Job Tasks/Elements	Rating				N/A	Comments
	S	G	F	P		
1.						
2.						
3.						

6. With which aspects of your job do you have the most difficulty?

7. What can the School do to improve training in your MOS?

Interviewer _____

ANNEX C

INTERVIEW FORM

COMMANDING OFFICERS/OPERATIONS OFFICERS

Unit Identification _____

		Circle		
Interviewee _____ One   CO   Opns O

1. How to graduates of these courses compare with graduates of earlier classes?

MOS	No. Grads	Better	About the Same	Poorer

2. In what specific ways are they better/poorer?

3. What was the level of job proficiency brought to your unit by school graduates in these MOS?

MOS	Excellent	Good	Fair	Poor

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