WAR DEPARTMENT TECHNICAL MANUAL

TM 21-250

ARMY

INSTRUCTION

WAR DEPARTMENT • 19 APRIL 1945

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"The Ideal Officer Is Not Afraid of Anything—— Not Even of a New Idea"

HON. ROBERT P. PATTERSON,
Under Secretary of War.

DECEMBER 11, 1942.

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ARMY INSTRUCTION

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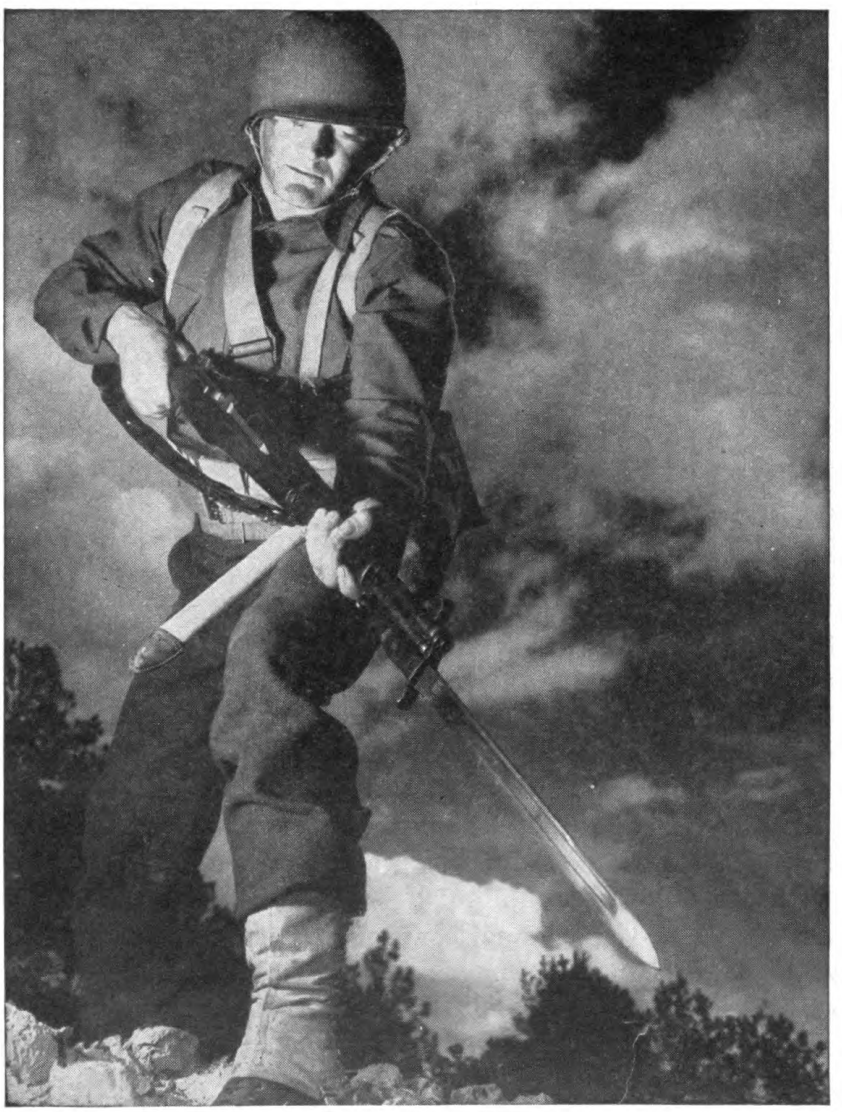


FIGURE 1.—He deserves the best possible training.

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CHAPTER 1

GENERAL

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SECTION I

GENERAL

	Paragraph
Purpose	1
Scope	2
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1. Purpose.—This manual is designed to assist Army instructors in efficiently carrying out their teaching objectives. All officers and noncommissioned officers of the Army of the United States must know how to teach. As specialists, they may have an excellent knowledge of some phase of the military profession; but in order to teach others, they must know the best methods and procedures for effecting the desired training in the shortest possible time. Success in teaching depends upon following a few simple fundamentals. This manual explains these fundamental methods and outlines the proper training procedure to follow.

2. Scope.—*a.* This manual contains the basic principles (see FM 21–5) to be used in training personnel of the Army of the United States. FM 21–6, 21–7, and War Department Training Circulars should be consulted for technical information and supplementary instructional materials.

b. This manual also outlines the basic procedures that are of value to the instructor in presenting his subject. Specifically, the manual will discuss preparation by the instructor, methods used in presentation, techniques of applying information and skills, purposes and types of examinations, procedures in conducting discussions and critiques, techniques of supervision of instruction, and selection and construction of training aids.

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3. Objective of Army training.—As stated in paragraph 2 of FM 21–5, the ultimate objective of all military training is to assure victory in the event of war. To accomplish this mission, the provisions of appropriate training programs must be efficiently executed. (See fig. 2.)

4. Army instruction.—*a.* Teaching is the process by means of which skills, knowledge, and attitudes are developed in students. Essentially, it consists of demonstrations, lectures, and applicatory exercises in which the student learns and adds to his experience in a way that increases his efficiency. Everyone has taught someone else

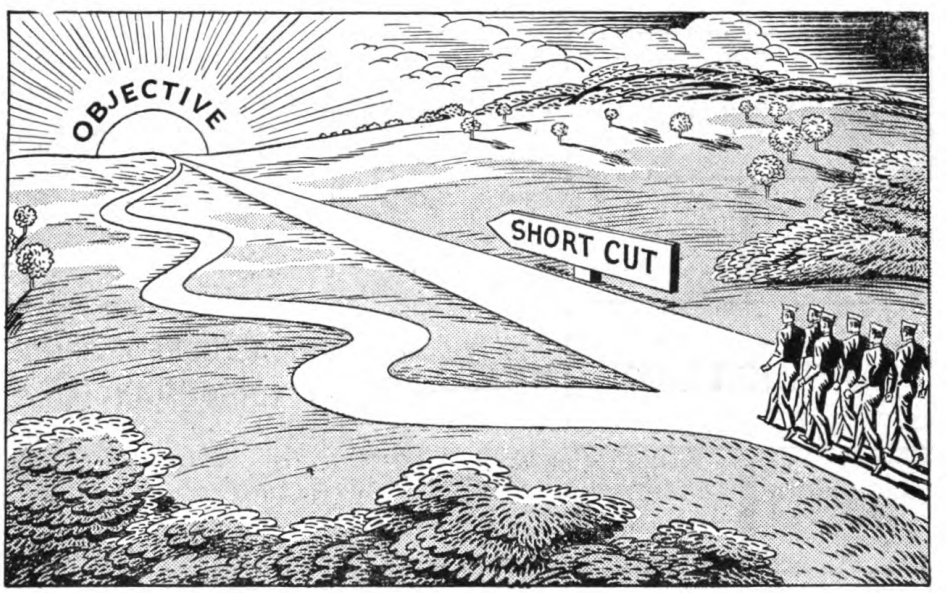


FIGURE 2.—Army instruction provides a short road to combat success.

to find his way through a city, to drive an automobile, to swim, or to ski. The Army instructor teaches his men the principles and procedures of military science, and the measure of his teaching success is how well and how rapidly his students learn.

b. As outlined in paragraph 64, FM 21–5, the teaching process is logically divided into five stages (see fig. 3).

(1) Preparation.
(2) Presentation.
    (*a*) Introduction.
    (*b*) Explanation and Demonstration.
(3) Application.
(4) Examination.
(5) Discussion and Critique.

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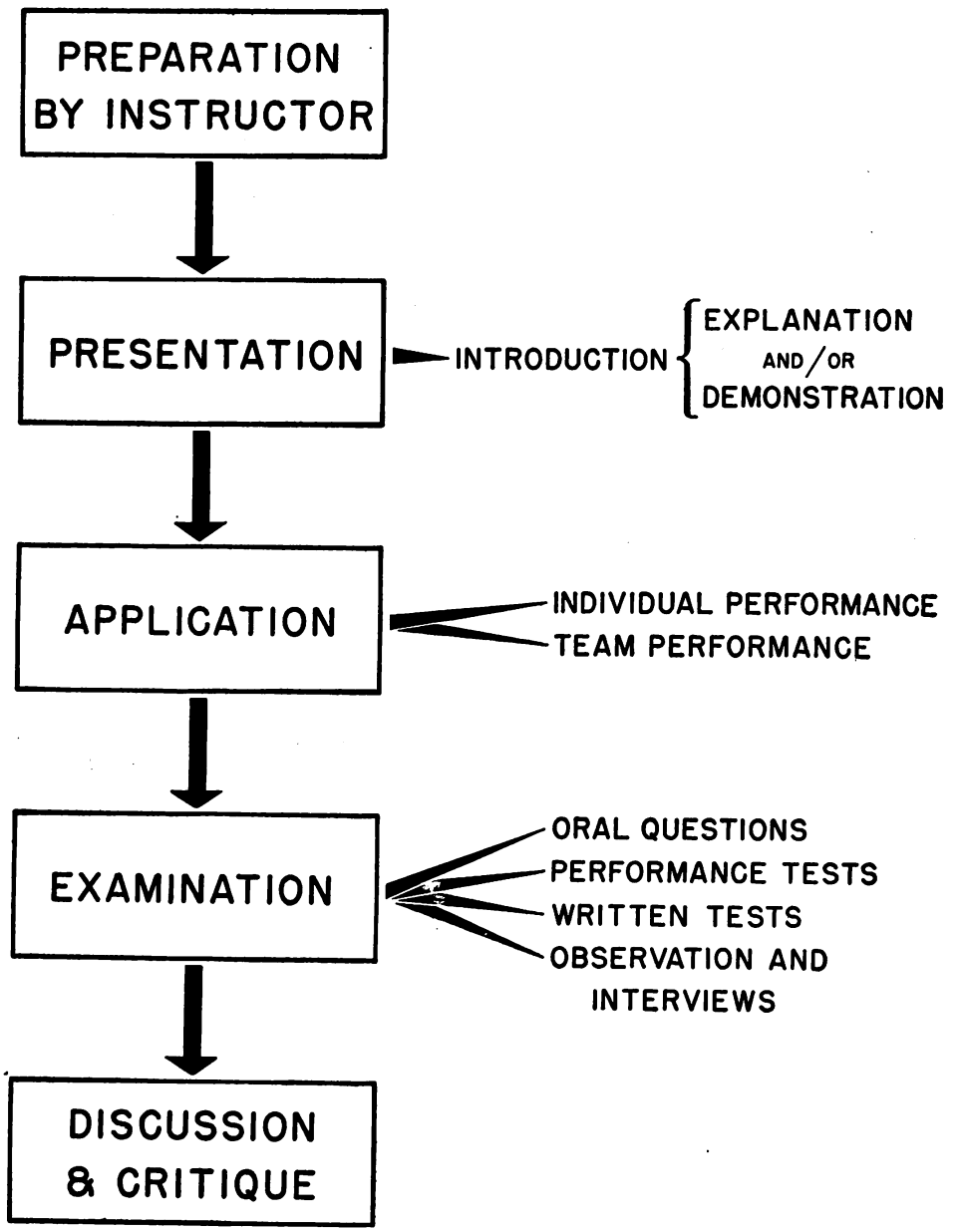


FIGURE 3.—Stages of instruction.

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SECTION II

STAGES OF INSTRUCTION

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Preparation	5
Presentation	6
Application	7
Examination	8
Discussion and critique	9

5. Preparation.—*a.* Careful planning is always the first step in efficient training. The instructor must analyze the specific procedures, skills, and information involved in teaching a student. He must organize materials so that the basic ideas are adapted to the student's background and needs and that the lessons are aimed at achieving specific objectives. He must present the content of a lesson so that learning is facilitated; the objective of the lesson will determine the methods to be used. In general, he will proceed from the simple to the complex, from the known to the unknown. (See ch. 2, and par. 65, FM 21–5.)

b. In nearly every case a student's failure to learn can be traced to the instructor's inadequate planning. Careful preliminary analysis, the correct solution of all instructional problems, and repeated rehearsal and review of procedures and materials should insure the transfer of knowledge to the student in the minimum amount of time.

c. Mastery of the subject matter is only the first stage of the instructor's preparation. He must know how to arouse the student's desire to learn, and how to present his subject material so that each member of the class learns all essential procedures and ideas.

6. Presentation.—In this stage of instruction, new ideas are made available to the student. The instructor will use two steps:

An introduction to arouse interest in the subject.

A presentation of the new material by means of explanations and demonstrations.

a. Introduction.—Developing the student's will to learn, the first step of presentation, is one of the instructor's unceasing problems. To solve it, he must familiarize himself with his student's military and civilian backgrounds in search of common interests and experiences which he can use to advantage. This information will furnish clues to the most effective approach in presenting materials. (See ch. 3.)

b. Explanation and demonstration.—(1) *Explanation* is the most common method of introducing new ideas and procedures. This may be accomplished by lectures, talks, or discussions leading to comparisons or contrasts in terms of what the student already knows, and graphic step-by-step illustrations. The instructor should bear in

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mind, however, that lectures and discussions are limited to the sense of hearing. A combination of techniques utilizing several senses—sight, touch, hearing—results in fuller learning and should be employed whenever possible. (See ch. 3 and par. 66, FM 21–5.)

(2) *Demonstration*, another method of presenting new materials, is of particular importance in Army instruction because of the practical nature of military training. This method leaves a vivid impression on the student because of its similarity to field use and the appeal of movement and actual objects. (See ch. 3 and par. 67, FM 21–5.)

7. Application.—Students learn most thoroughly by doing, and the capable instructor will have his students apply the principles

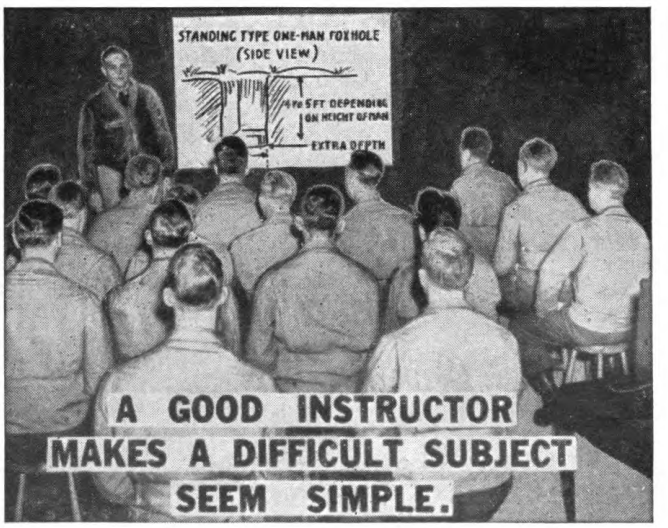


FIGURE 4.—Illustrating a subject.

and procedures learned in each lesson. This application is one of the ways a good instructor makes a difficult subject seem simple. His students, as individuals or as teams, should apply under his supervision what they have learned, thereby proving to themselves as well as to the instructor their mastery of the subject matter. Army instruction provides many opportunities for both individual and team performance. (See ch. 4 and par. 68, FM 21–5.)

8. Examination.—In this step is measured the student's mastery of the materials taught. The instructor can be certain that the students have mastered the essentials only after he has checked their ability to perform without assistance. In testing, he faces the problems of *what* to measure and *how* to measure. A number of different testing techniques should be used to evaluate student progress. (See ch. 5 and par. 69, FM 21–5.)

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9. Discussion and critique.—The purpose of discussion is to clarify the important points of a lesson or applicatory exercise which have been covered during the previous stages of instruction. When it is apparent during the application stage that additional explanation of a topic is required by the students, discussions may be held immediately after the application and before the examination is given. Discussions are also held following examinations. A critique is a discussion held at the conclusion of an applicatory tactical exercise and must include a brief review of the tactical principles involved. (See ch. 6 and par. 70, FM 21–5.)

SECTION III

INSTRUCTOR'S TASK

Paragraph
Training for combat success 10

10. Training for combat success.—The combat success of the Army of the United States depends in large part on the effectiveness of the instruction of individuals and units given in the training areas prior to battle. Responsibility for this instruction warrants careful study on the part of all instructors. In carrying out the training program, the instructional staff should constantly bear in mind the following fundamentals:

a. Most men can master the fundamentals of military training if they are well taught.

b. The instructor's keenness and enthusiasm will be reflected by the men he is training. Half-hearted or inefficient methods will carry a heavy penalty later in battle.

c. The student's interest and enthusiasm are stimulated by evidence of satisfactory progress. Give praise where it is due. Encourage effort and correct mistakes at once by constructive criticism.

d. Students are more quickly and permanently impressed with facts when their practical value is made apparent.

e. In teaching men to be soldiers, a good example is more effective than any amount of discussion.

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CHAPTER 2

PREPARATION

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SECTION I

GENERAL

	Paragraph
Planned attack necessary	11

11. Planned attack necessary.—*a. Instruction, like tactical operations, must be planned.*—In developing a plan of combat, a commander considers his mission, the terrain, the disposition and relative strength of the opposing forces, distances, time of day, climatic conditions, and facilities for supplies and reinforcements. Similarly, an officer in charge of training must study all factors pertaning to the training situation before he can devise an effective instructional plan.

b. An estimate of the training situation is essential.—This is a basic step in planning instruction. This estimate, like that in a tactical operation, is a continuous process; every day some new aspect of the training situation requires the making of a decision relating to the instructional program. The factors to be considered in the estimate (pars. 15 to 24, incl., FM 21–5) are as follows:

(1) *Mission (training objective).*—What is the purpose and scope of this phase of the training?

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(2) *Essential subjects (relative importance and scope of each).*—How important is each subject in the total training program? What skills and facts are necessary for the successful performance of each job in the field? Will these be taught in *basic*, *technical* and *tactical*, or *logistical* training?

(3) *Time.*—How much time is available and required for each phase of training? Into what length periods should the available time be divided? (Par. 18, FM 21–5.)

(4) *Equipment and facilities.*—What training aids are ready for use? What additional aids must be supplied? What are the provisions for indoor and outdoor teaching?

(5) *Instructional personnel.*—Is the staff of instructors sufficiently large and well trained? Must new instructors be selected? What training in teaching procedures should be given to the instructors?

(6) *Local conditions.*—(*a*) *Climate.*—What types of training can be most efficiently given in this climate? How will seasonal changes affect the program?

(*b*) *Terrain.*—Is the available terrain suitable for the instruction? Are training aids necessary to supplement the available terrain?

(7) *Existing state of training.*—What is the existing state of the training program? Is the instructional staff being used to best advantage?

(8) *Organization for training.*—What is the purpose of the training? Is the organization the best possible in terms of the purpose?

(9) *Obstacles.*—(*a*) *Administrative.*—Do excessive guard, fatigue, and special duty assignments interfere with the training program?

(*b*) *Physical.*—How can physical obstacles be overcome?

(*c*) *Human.*—Are the personal eccentricities and interests of the commander or instructors interfering with the development of a well-rounded program?

c. Decision.—In terms of his estimate of the situation, the officer in charge arrives at his decision as to—

(1) What general plan for the training should be devised. (See par. 25, FM 21–5.)

(2) What specific plans for teaching should be prepared.

d. Results of effective planning in instruction are readily apparent.—A well-planned, well-organized, and well-executed program of instruction has an immedate effect—the production of well-trained soldiers and units.

e. Instructional reference materials.—Before planning the instructional program in accordance with the training directives, the officer in charge will study this manual carefully as well as FM 21–5, 21–6,

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and 21–7, FS 7–75, and TF 7–295. Each instructor must be completely familiar with these publications.

SECTION II

SELECTION OF MATERIAL FOR INSTRUCTION

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Procedure	12
Analysis of training mission	13
Analysis of the situation	14
Organizing materials	15

12. Procedure.—*a. The course outline is the basis for selection.*—To meet a general Army training objective, courses have been carefully prepared by officers with wide experience in Army instructional practices. The course outline lists the subject matter, references, and total time allotted. These outlines are supplemented in part by Unit and Replacement Training Center Mobilization Training Programs, Courses of Instruction for R. O. T. C. and O. R. C. units, and Master Training Programs issued by higher commanders. These directives form the basis for the detailed selection of instructional materials made by subordinate commanders in preparing training programs and schedules.

b. Three steps are necessary in selecting material for instruction.—They are as follows:

(1) *Analyzing the training mission into specific teaching objectives.*—The determination of these objectives requires an analysis of the general training mission and of the job for which the men are being trained. This analysis consists of answering the question, "What should the instruction accomplish?" in terms of the performance expected of the students.

(2) *Making an analysis of the situation* (see par. 15, FM 21–5).—(*a*) *Training situation.*—This includes a consideration of such factors as world conditions, the personnel available as instructors, the students to be taught, the place where training will take place, and the time and equipment available. (See par. 14.)

(*b*) *Selection of instructional material.*—On the basis of the analysis of the training mission and the job for which the men are being trained, together with the analysis of the training situation, the materials to be presented are selected. Some phases of the job may have to be omitted because of lack of time; or changes in the relative importance of the objectives in terms of world conditions may result in changes in emphasis on certain aspects of the subject matter.

(3) *Organizing the materials to be taught.*—On the basis of the

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course objectives and the estimate of the situation, the subject matter is organized into instructional segments and the training programs and schedules are developed. (See pars. 25 to 28, incl., FM 21–5.)

c. The three steps are closely related.—The detailed instructional plan develops naturally from the statement of the specific teaching objectives and the analysis of the situation. This analysis, however, is influenced by the statement of the objectives. These steps are simply phases of a single process of developing an instructional program which will meet most effectively the desired training mission.

13. Analysis of training mission.—*a. Purpose.*—The training directives must be amplified and stated in terms of what is to be taught before the instructional program can be carried out. This clarification is brought about by analyzing these training directives in terms of the job as it will be performed in the field. The results will be the specific teaching goals or objectives to be attained in the instructional situation.

b. Objectives.—Objectives should be practical. Stating objectives in terms of the exact procedures and information required for field use gives them practical value. (These statements should indicate the procedures and facts the student is to be taught and the performance expected of him.)

(1) Following are some of the broad general objectives of a basic training course:

(*a*) To learn the principles of military courtesy.

(*b*) To learn the principles and practices of first aid.

(*c*) To develop the ability to use defensive tactics against air attack.

(2) To be useful in the selection of materials for job assignments and lessons, these general objectives must be made concrete and detailed. For example, a few specific objectives for job assignments in first aid are to—

(*a*) Know how to use the first-aid packet.

(*b*) Know the procedures to be used in treating fractures, dislocations, and sprains.

(*c*) Know the methods of transporting sick or wounded soldiers.

(*d*) Be able to use the prone pressure method of artificial respiration.

c. Job analysis.—A job analysis is essential. In order to make the objectives practical and specific, an analysis of the general training mission and of the job for which the men are being trained must be carried out. This job analysis is simply the process of breaking down the job or general directive into its component parts to determine the skills, information, or operations required for the successful perform-

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ance of the job or the fulfillment of the instructional mission. It is made for the purpose of determining what the students are to learn. (See fig. 5.)

(1) The general directives are formulated on the basis of a preliminary job analysis made in headquarters to indicate the broad aspects of the job which must be taught. The specific teaching objectives are then formulated by subordinate commanders in terms of these initial directives. The commanders will amplify all previous analyses in order to define exactly the procedures, operations, and information to be taught.

(2) A job analysis is defined generally in terms of procedures from which the facts and skills necessary to complete a particular operation are derived. For example, what does a person do in squaring off the end of a board? That job might be analyzed into the following procedures:

(*a*) Placing the board on a secure base.
(*b*) Placing the square against one edge of the board.
(*c*) Making a mark along the edge of the square.
(*d*) Sawing off the end of the board.

All four separate procedures must be performed well in order to secure a satisfactory result.

(3) An example of a job analysis of an ordnance task follows:

Job: Inspection of the M1903 rifle.

(*a*) Visual inspection for general appearance.
(*b*) Visual inspection of the bore for bulges, pits, and other defects.
(*c*) Bore gaging with the breech gage.
(*d*) Headspace gaging with field test bolt and headspace gages.
(*e*) Function test with dummy ammunition.

(4) More comprehensive operations require more lengthy analysis, but the procedure is the same. The objectives, principles, operations, facts, tools and equipment, materials, terms, and references in each phase of a subject should be listed in tabular form as shown in figure 5.

(5) There is a tendency to underemphasize or omit minor points in analyzing a job. Men who are specialists in certain skills often forget that many of the operations which they now take for granted had to be learned when they were beginners. A carpenter finds it hard to remember that at one time he did not know how to hold a hammer; and a drill sergeant is likely to overlook the many small points which, if not properly emphasized, make learning the Manual of Arms difficult for recruits. In making a job analysis *all* the essential procedures, facts, and principles of the particular job under consideration are studied.

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Job Assignments	*Objective*	*Operations*	*Principles*	*Facts*	*Tools and Equipment*		*Materials*		*Terms*	*References*
					Items	*Care*	*Items*	*Uses*		
(See par. 15)	(See par. 13)	(See par. 13c—List of all the important operations and skills in the job assignment)	(See par. 13c—List of the basic principles to be learned by the students)	(See par. 13c—List of the essential facts in the job assignment)	(List of tools and equipment needed)	(Special care needed for each)	(List of materials needed)	(Use to be made of each)	(List of technical terms)	(List of all Field and Technical Manuals, Training Circulars, Army Regulations, etc., which pertain to the job assignment. See also FM 21-6)

FIGURE 5.—Job analysis chart for each subject of a course.

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(6) The job analysis indicates only *what* is to be taught. It does not show *how* the operations are to be presented, nor does it indicate the *order* of teaching. For example, a soldier must be able to read and to make simple maps. An analysis of procedures used in reading and making maps would show that knowing the conventional map

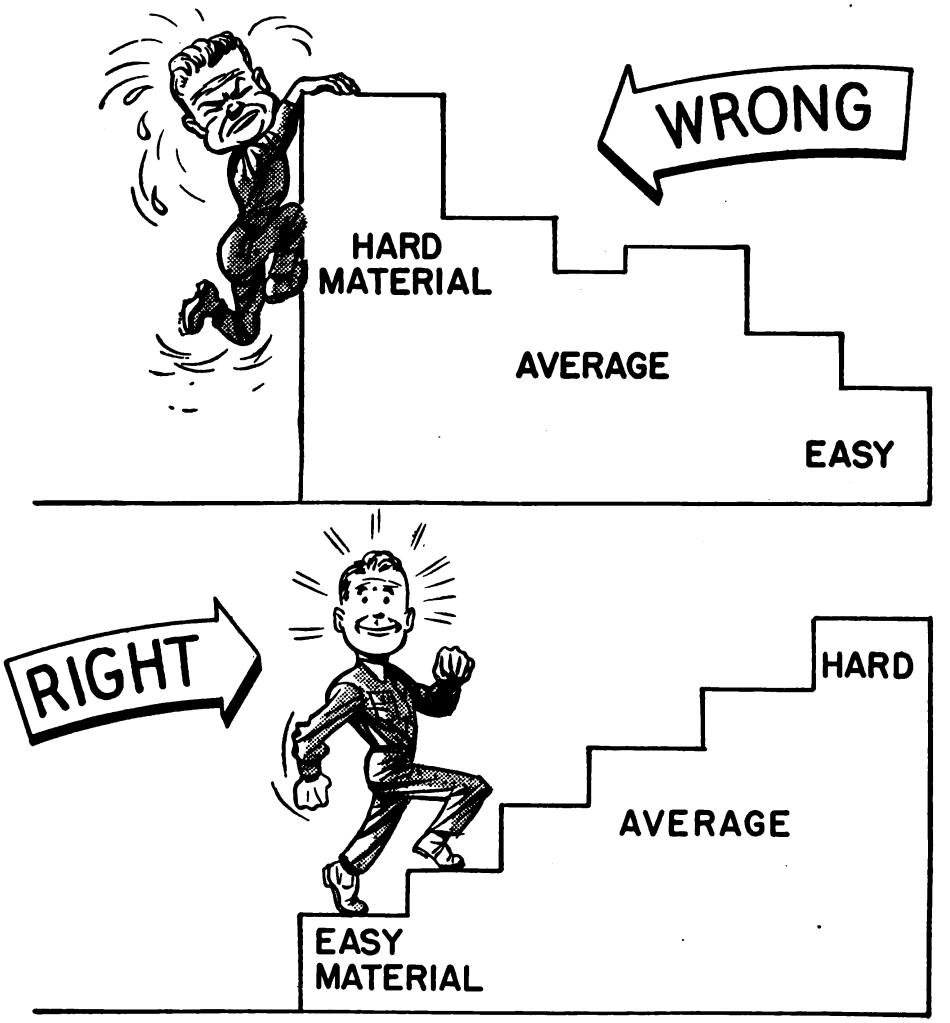


FIGURE 6.—Arrangement of teaching materials.

symbols, understanding the meaning and use of "scale," and developing simple drafting skills are important. But the analysis does not show which of these should be taught first, how the instruction should be given, or which phases could be most effectively taught indoors and which outdoors. Similarly, an analysis of firing a rifle in combat shows that knowledge of the effect of wind and sight changes is the

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WHAT WILL BE TAUGHT

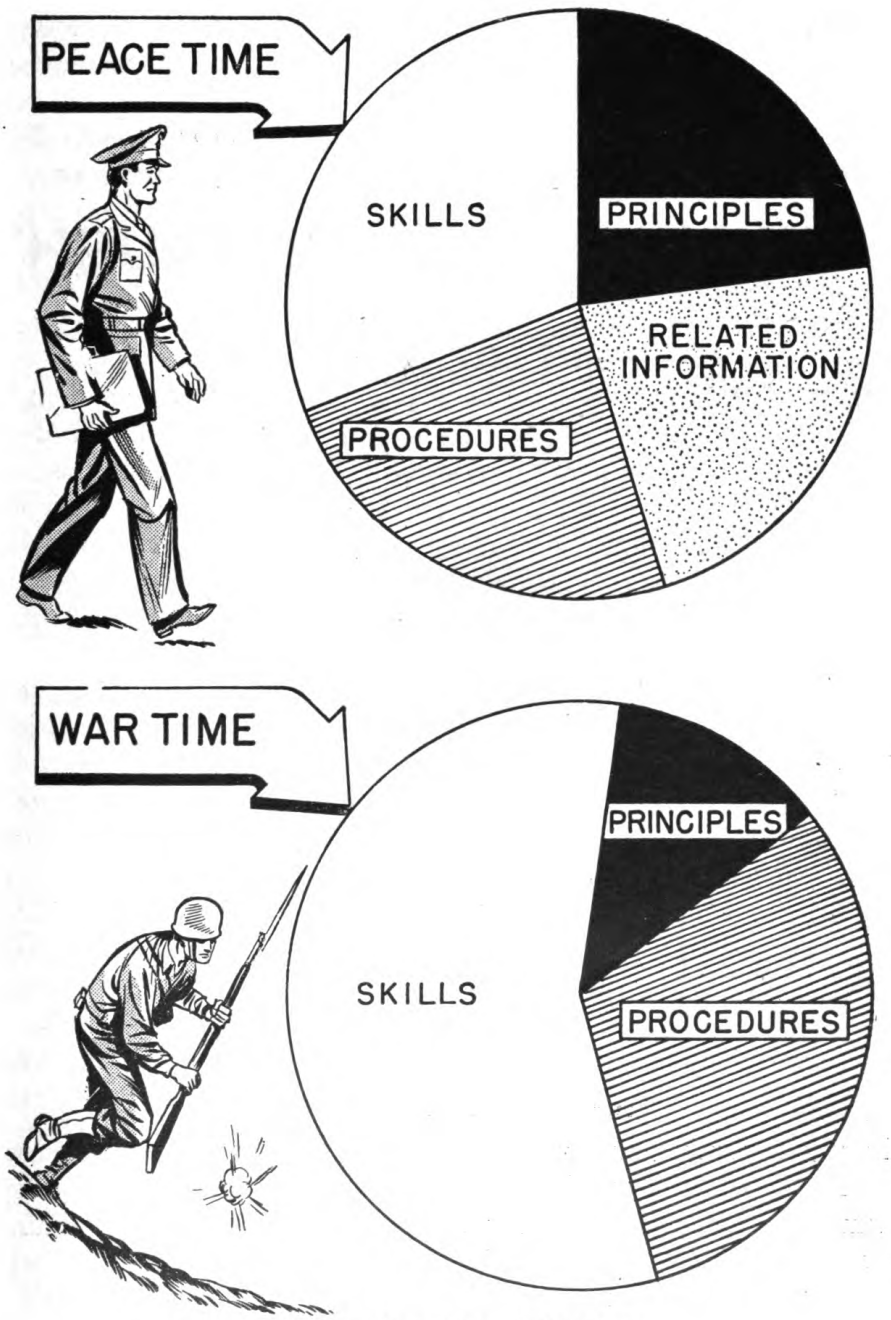


FIGURE 7.—Comparison of objectives.

initial factor in accurate firing, yet that is not the first thing to be taught a man who has had no experience with firearms. Teaching

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procedures and teaching order are determined by studying the ways in which men learn, not the way in which the job is performed in the field. (See pars. 18 and 53, and fig. 6.)

14. Analysis of the situation.—*a. Estimate.*—This is an analysis of the factors that will influence the selection of materials to be taught in a course, subject, or job assignment, as defined by the specific teaching objectives.

b. Training situation.—(1) *National and world conditions.*—These conditions have a direct bearing on Army training programs, not



FIGURE 8.—The instructor's bull's-eye.

only on the number of men who are giving and receiving instruction but also on what is taught. In periods of emergency, the pressure of time and the demands for specific combat operations may eliminate material that might be "well to know" under normal conditions, while specific skills, procedures, and principles that are related to the demands of the emergency will be emphasized. The effect of world conditions on a training program is illustrated in figures 7 and 8.

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(2) *Time available.*—(*a*) The amount of time available for each subject in a training program determines to a large extent *how much* will be taught. Some material which it may be desirable to include in a 9-month course would have to be eliminated if the allotted training time were reduced to 3 months during emergencies. Thus, instruction in the use of a gas-operated weapon might at one time include the theoretical principles of the recoil mechanism; but if the length of time were reduced, the course would be pared to the minimum essentials of practical field operations. The problem is that of selecting those materials of greatest importance which can be taught in the allotted time.

(*b*) Figure 8 shows teaching material divided into three degrees of importance. Each item of information and each skill considered for a subject, job assignment, or lesson should be rated on this scale and included or rejected depending on its importance to the students in reference to national conditions and the training situation. An example of the problem of how much will be taught occurs when teaching first aid. In a job assignment on first-aid measures for battle wounds there are a number of things that the soldiers *must know*, such as pressure points, tourniquets, antiseptic measures, and types of bleeding. He *should know* types of bandages, wounds, and burns. There are related facts which might be taught if time permitted, such as the role of medical troops in the field and the comparison of modern first-aid equipment with that used in the past, but such points are not important enough to be taught if only 2 hours are available for the job assignment. With reference to figure 8, time usually does not permit teaching materials beyond the *should know* ring. An instructor, however, will know the information in all rings.

(3) *Equipment and facilities available.*—The fifth factor considered in estimating the training situation is the facilities available for training. Indoor instruction is influenced by the type of classroom used. Outdoor training is affected by the terrain and climate. Instruction is either hampered or helped by the training aids at the disposal of the staff.

(4) *Instructors.*—The personnel available as instructors affects the training program, as teaching is no more effective than the instructors who are carrying it out. The officers planning a training schedule investigate the situation with regard to the number of instructors, their training, the teaching assignments to be made, and the supervision required. (See ch. 7 for procedures to be used in selecting and training instructors.)

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(5) *Students.*—Effective training depends in part on the instructor knowing as much as possible about the men being taught, and adapting the subject matter and procedures to their interests and abilities. The officer in charge will consider the background of the men, the size of the classes, and the effect of other subjects in the training program.

(6) *Local conditions.*—See paragraph 21, FM 21–5.

(7) *Existing states of training.*—See paragraph 22, FM 21–5.

(8) *Organization for training.*—See paragraph 23, FM 21–5.

(9) *Obstacles.*—See paragraph 24, FM 21–5.

15. Organizing materials.—*a. Divisions of the course.*—The materials selected in terms of the job analysis and the estimate of the training situation are organized for instructional purposes as follows:

(1) *Subjects.*—Major, broad subdivisions of the course. (See fig. 9.)

(2) *Job assignments.*—Logical subdivisions of subjects. (See fig. 10.)

(3) *Lessons.*—Feasible teaching segments of job assignments. (See fig. 11.)

b. Subjects.—Every course can be divided into a number of subjects. In a course for administrative clerks (see fig. 9) the subjects are touch typing, Army organization, correspondence, common forms, personnel administration, company records and reports, filing, mimeograph, and practical experience. Each subject comprises a broad block of skills and information essential to efficient training.

c. Job assignments.—Each subject is divided into smaller subdivisions which, in instruction, are called job assignments. Figure 10 shows the job assignments into which the subject, Personnel Administration, can be divided.

d. Lessons.—A lesson is a teaching segment of a job assignment devoted to the attainment of one specific objective. In figure 12 the objective of the lesson is, "To teach filling out a report of change card," and the class activity is all directed toward that goal. (See pars. 88 to 91, incl., FM 21–5.)

e. Master list of subjects.—As the final step in organizing the course, a master list of the subjects should be prepared. This provides the instructor with a complete picture of the course. The master list (see fig. 9) should give in detail:

(1) The list of subjects in the course.

(2) The number of hours allotted to each subject.

(3) The texts, manuals, and other references containing pertinent information.

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No.	Subjects	Hours	References
1.	Touch typing	50	(Omitted for lack of space.)
2.	Army organization	30	
3.	Correspondence	20	
4.	Common forms	25	
5.	*Personnel administration	25	
6.	Company records and reports	40	
7.	Pay rolls	35	
8.	Discharges	20	
9.	Miscellaneous forms and reports	25	
10.	Filing	15	
11.	Mimeograph	10	
12.	Practical experience	55	
	Total number of hours	350	

*Indicates subject outlined in detail in figure 10.

FIGURE 9.—*Outline for administration clerks' course.*

No.	Job assignment	Hours	Number of Lessons	References
1.	Organization of personnel office	3	12	(Omitted for lack of space.)
2.	*Reports of change cards	3	8	
3.	Qualification card	3	9	
4.	Service record	11	47	
5.	Pay cards	½	1	
6.	Transfers	2	7	
7.	Army serial number	½	1	
8.	Rosters and returns	2	5	
	Total number of hours	25		

* Indicates job assignment for list of lessons in figure 11.

FIGURE 10.—*Job assignments in subject No. 5 (fig. 9), personnel administration.*

No.	Lesson title	Hours	References	Training aids
1.	General	⅛	(Omitted for lack of space.)	(Omitted for lack of space.)
2.	*Preparation of reports of change cards (left side)	⅜		
3.	Preparation of reports of change cards (right side)	⅜		
4.	Changes on officers	½		
5.	Changes on enlisted men	½		
6.	Changes on status which are not reported	¼		
7.	Special cases	¼		
8.	Disposition of reports of change cards	½		
	Total number of hours	3		

* Indicates lesson for which detailed plan appears in figure 12.

FIGURE 11.—*Lessons in job assignment No. 2, reports of change cards.*

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LESSON TITLE: No. 2. Filling Out Left Side of Report of Change Cards.
COURSE: Administrative Clerks. INSTRUCTOR: Sgt. H. A. Barnhold.
SUBJECT: No. 5. Personnel Administration. DATE: 9/29/19—. HOUR: 1100.
JOB ASSIGNMENT: No. 2. Preparation of Report of Change Cards.
LESSON OBJECTIVE: Learning how to fill out the left side of a report of change card.

TRAINING AIDS: Large wall chart of report of change card, blackboard chart of report of change card for instructor demonstration, report of change cards for each student.
REFERENCES: AR 345–800; TM 12–250.
TIME REQUIRED: 20 minutes.
I. PRESENTATION:

INTRODUCTION: Lecture—1 minute.

1. We have indicated that the primary source of information for preparing a report of change card is the morning report.
2. Now, using this information, we will show how to fill out the left side of the card.

EXPLANATION and/or DEMONSTRATION: Illustrated lecture—6 minutes; demonstration—5 minutes.

1. Recording the serial number.
   a. Member of Regular Army.
   b. Selective Service.
2. Rank on line marked Grade.
   a. If change in grade reported, former grade recorded.
3. Name of soldier.
   a. Last name, first name, middle initial.
   b. If no initial, write NMI.
4. Indicate Arm or Service of soldier.
5. Organization with which serving.
   a. Record name of organization of which soldier is a member.
6. Organization or Headquarters from which rendered.
   a. Name of Organization or Headquarters making report.
   b. Show address of post making report.
7. Date on left side.
   a. Normally that of previous day.
   b. Special cases will be taken up later.

DEMONSTRATION BY INSTRUCTOR (left side of card): Using large blackboard chart of report of change card for the following situation: Selective Service Trainee, Private William L. Doe, 32210211, Co. F. 3rd Infantry Training Battalion, Fort Blank, New York, was appointed Corporal on November 1, 1941. His report of change card was made out November 2, 1941, at Headquarters, Infantry Replacement Training Center, Fort Blank, New York. 1st Lieut. Arthur G. Olson, Infantry, is the personnel officer.

FIGURE 12.—Lesson plan.

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II. APPLICATION: Demonstration—5 minutes.

1. Each student is given a blank report of change card and required to fill out the left side in terms of the situation listed below.
2. SITUATION: Selective Service Trainee, Corporal Charles Green, 32500101, Co. A, 1st Signal Training Battalion, Camp Blank, Illinois, on September 15, 1941, was detailed to special duty at Fort Blank, New York. His report of change card was made out on September 18, 1941, at Headquarters, Signal Corps Replacement Training Center, Camp Blank, Illinois. Captain Willard E. Lee, Signal Corps, is the personnel officer.

III. EXAMINATION: Oral Questioning—2 minutes.

1. What grade is recorded on the line marked "Grade" if a change in grade is being reported?
2. What date is usually reported on the line marked "Date"?
3. What entry is made on the line marked "Organization with which serving"?
4. From what source is the information required for filling out the report of change card usually secured?

IV. DISCUSSION: Lecture—1 minute.

Instructor will summarize the problem required in the application step, correct any points not clear, and start introductory lecture on filling out the right side of the card.

FIGURE 12.—Lesson plan—Continued.

SECTION III

THE LESSON PLAN

	Paragraph
Purpose	16
Characteristics of a good lesson	17
Arranging materials in teaching sequence	18
Preparing the plan	19
Checking the plan	20
Using the plan	21

16. Purpose.—The purpose of a lesson plan is to insure that each lesson is well taught. *It shows what material is to be taught, in what order it is to be taught*, and *exactly what procedures will be used* (see fig. 13). Each lesson plan is an outline of one small segment of a course showing the manner in which the teaching of a specific objective will be accomplished. A well-written lesson plan will fulfill these functions:

a. Insure wise selection of material and elimination of unimportant details.

b. Make certain that proper consideration is given each part of the lesson.

c. Aid the instructor in presenting the material in the proper sequence for efficient learning.

d. Provide an outline of the teaching procedures to be used in the classroom or in the field.

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LESSON TITLE: _____
COURSE: _____ INSTRUCTOR: _____
SUBJECT: _____ DATE: _____ HOUR: ___
JOB ASSIGNMENT: _____
LESSON OBJECTIVE: _____

TRAINING AIDS: _____
_____
REFERENCES: _____
TIME REQUIRED: _____

I. PRESENTATION: _____
INTRODUCTION: (Method _____ Time required) _____
_____
_____
EXPLANATION and/or DEMONSTRATION: (Method _____ Time required) _____
_____
_____
_____
II. APPLICATION: (Method _____ Time required) _____
_____
_____
_____
_____
III. EXAMINATION: (Method _____ Time required) _____
_____
_____
IV. DISCUSSION: (Method _____ Time required) _____
_____
_____
_____

FIGURE 13.—Lesson plan form.

e. Serve as a means of relating each lesson to the objectives of the whole course.

f. Give the inexperienced instructor a feeling of self-confidence.

17. Characteristics of a good lesson.—*a. Unity.*—Each lesson should be a unified segment of instruction. A lesson is concerned with one objective and all teaching materials and procedures are selected to attain that objective.

b. Content.—Each lesson should contain some new material. These new facts, principles, or procedures should be related, however, to the lessons or subjects already presented; a short review of the earlier lessons is often necessary.

c. Scope.—Each lesson should be reasonable in scope. Men can master only a few skills or principles at one time, the number depending on the complexity. Presenting too much material in one lesson results in confusion; too little, in inefficiency.

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d. Practicality.—Each lesson should be planned in terms of training conditions. The indoor and outdoor teaching locations will determine in part the way in which each lesson can be taught. Similarly, the types and quantities of training aids available will influence the lesson planning and instructional procedures.

e. Relation to course.—Each lesson should be so planned and taught that its relation to the course mission is clear to every student. In some instances, such as teaching men how to give first-aid treatment to wounds, the importance of the lesson to the major objective of the Army is obvious. In others, such as training men in the filling out of morning reports, learning will be expedited if the students are given a clear idea of their importance in keeping accurate records of troops available for duty.

f. Instructional steps.—Every lesson, as developed, falls logically into four steps:

(1) *Presentation.*—See chapter 3 and paragraphs 39, 64, 66, and 67, FM 21–5.

(*a*) Introduction.

(*b*) Explanation and demonstration.

(2) *Application.*—See chapter 4 and paragraphs 68, and 104 to 120, inclusive, FM 21–5.

(3) *Examination.*—See chapter 5 and paragraph 69, FM 21–5.

(4) *Discussion.*—See chapter 6 and paragraphs 70, 73, and 121, FM 21–5.

18. Arranging materials in teaching sequence.—*a.* The chief criterion in arranging materials in teaching sequence is that the order "make sense" from the learners' point of view. The instructional order of materials frequently differs from the order in which they will be used later by the learner. The sequence in which map reading can be taught is a good example. One way is to give students a detailed contour map, to explain all the details and symbols, and to tell them at what scale the map is drawn and how it is oriented. But this procedure would invariably confuse men inexperienced with maps. It would be far better for the instructor to begin with the simplest and most evident thing on a map—the roads. Each man could be given a map of a small section of land on which nothing but the roads are drawn, and the class could be taken to a hill from which the roads can be seen. The instructor would show them how to turn their maps so that the roads on the map are parallel to the corresponding roads on the ground. He could then point out the crossroads, forks, and bends. The next step might be to have the students indicate on their maps a nearby house. Most of them will make a small square, and will place it approximately correctly. The most common error will be that the

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square is too large, but this error should not be corrected *at this time* because it is a detail not related to this lesson. If, however, some of the men do not locate the house correctly, this source of error should be checked and further help given. The next step might be having the students locate some trees near the house. Again, the trees will probably be too large, but this is not important. Only after the men have become thoroughly familiar with the way in which a map shows the location of objects should the matter of scale be discussed. In contrast to this teaching sequence, a trained map reader in using a map will check at once the scale at which the map has been drawn.

b. The teaching order illustrated above is called "psychological" because—

(1) The student sees the immediate necessity for what he is given to master.

(2) He can make use at once of the skills he learns.

c. Opposed to this procedure is the "logical" sequence in which materials are arranged in order of difficulty, or in logical divisions of the subject matter. In a logical sequence the student often does not see the reason for what he is expected to learn nor can he make immediate use of it. Logical sequence has its advantages, but is less likely to arouse or hold student interest. Subjects termed "dry" are usually considered so because they are arranged logically with little regard for student interests or background. Both types of arrangement of teaching materials have their place, but the psychological method of arranging materials generally should be used for beginners; the logical for students who have had considerable background and experience in the subject.

d. General principles of arranging in sequence new ideas or procedures of a lesson are as follows:

(1) Arrange the material so that the student will see the necessity for each step in the instruction as it occurs; that is, plan the sequence so that the materials have meaning from the point of view of the learner.

(2) Start with material with which the student is familiar and proceed to that which is new; that is, work from the known to the unknown.

(3) Proceed from the simple to the complex whenever this is in harmony with the principles in *a* and *b* above.

19 Preparing the plan (see pars. 88 to 91, incl., FM 21–5).—The lesson plan form that will best meet the needs of instructors may vary from one situation to another, but a form that applies to most situations is shown in figure 13. The procedure used in making lesson plans is shown in figure 14, and the important points are listed

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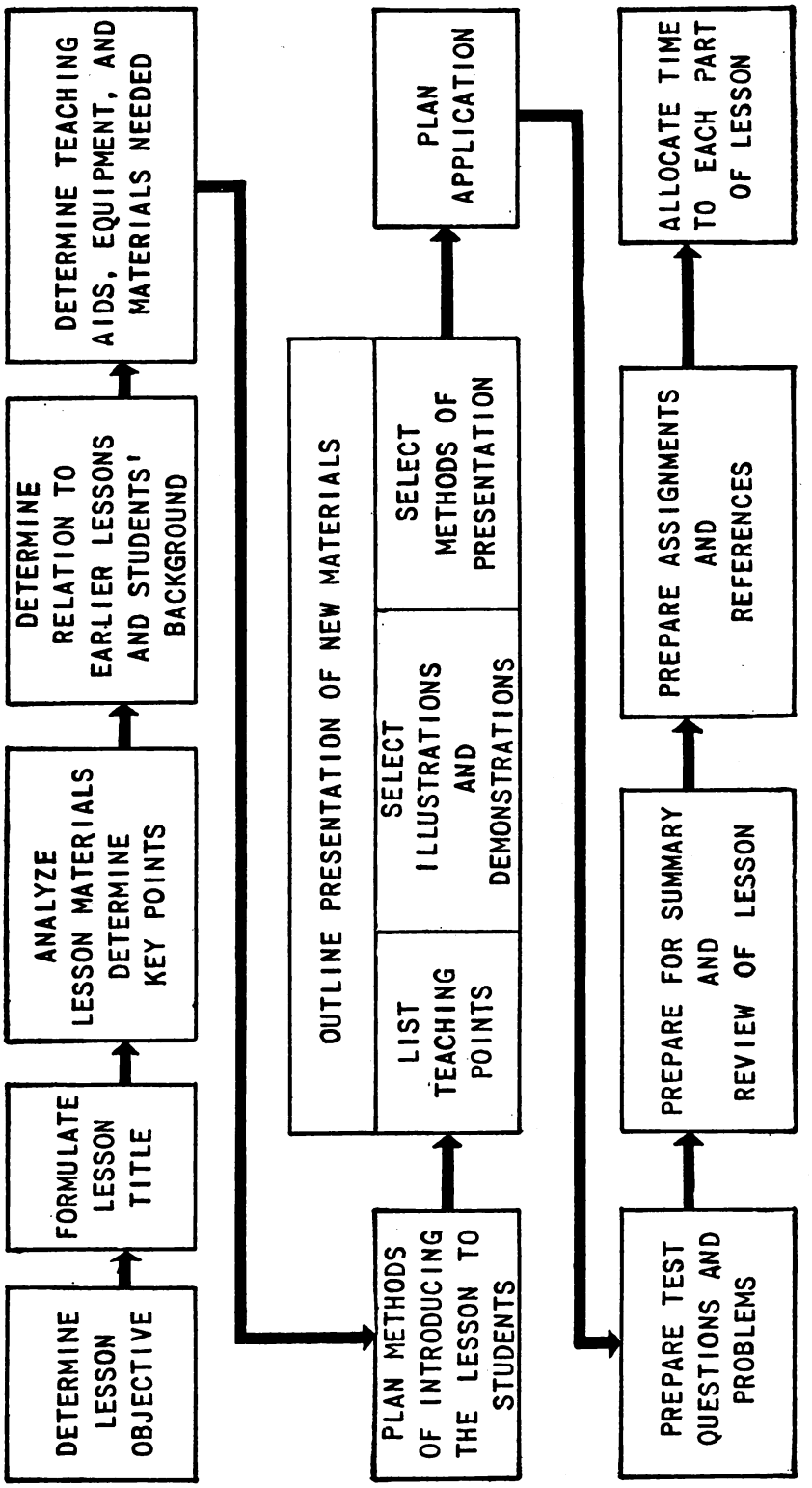


FIGURE 14.—Lesson plan procedure.

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below. The officer responsible for supervising the instruction should be sure these points are considered when the lesson plans are prepared.

a. All references, such as texts, Technical and Field Manuals, Army Regulations, Training Circulars, Training Films, and Film Strips (see FM 21–6, 21–7, and Training Circulars), pertaining to the lesson should be studied and the important points listed.

b. The objective of the lesson should be clearly and specifically stated.

c. A lesson title should be formulated.

d. The time allotted for the entire lesson and for each of the four steps of instruction should be noted. The teaching time used in covering one lesson plan is not fixed arbitrarily at one 50-minute period. The materials in some lesson plans may take 1 hour, others ½ hour, and some may take several hours. Consequently, several lessons may be presented in one class period, or one lesson may require several periods.

e. The place in which the instruction is to be given should be selected, the necessary arrangements for its use should be completed, and it should be made ready for the lesson.

f. The equipment and teaching aids should be listed, procured or prepared, and made ready for use. It is the instructor's responsibility to make certain that these are in readiness for the lesson. (See pars. 77 to 84, incl., and 87, FM 21–5 and pars. 2 to 8, incl., FM 21–7.)

g. The presentation step should be planned in detail. The plan should include—

(1) The means of arousing the interest of the students and preparing them for the new materials.

(2) A list of the new facts or skills to be presented arranged in the proper teaching order.

(3) The teaching procedures to be used in presenting the new facts or skills.

h. The application step should be completely organized with reference to equipment and procedures to be used, assistants required, and questions or problems to be raised.

i. The examination step must be so prepared that student mastery of the objectives is checked.

j. Figure 12 shows a lesson plan on preparation of report of change cards and illustrates how each phase of a teaching assignment can be planned. The teaching aids and required references are listed, the relation of the lesson objective to the course is indicated, and the ideas to be presented are listed. Provision has likewise been made for student application and for an examination. Figure 15 shows a plan

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prepared for a lesson on the description and operation of the sight M4 for the 60- and 81-mm mortars.

LESSON TITLE: No. 7. Description and Operation of Sight M4 for 60- and 81-mm Mortars.
COURSE: Fire Control. INSTRUCTOR: Lt. G. M. Smith.
SUBJECT: No. 2. Instrument Repair. DATE: 9/7/19——. HOUR: 0800.
JOB ASSIGNMENT: No. 7. Sight M4 for 60- and 81-mm Mortars.
LESSON OBJECTIVE: To learn description and operation of sight M4 for 60- and 81-mm mortars.

TRAINING AIDS: Sight M4, 1 per student; TM 9–1535, SNL F–148, SNL F–1, 1 per student; 81-mm mortar, film strip FS 7–25 and projector, projection screen, large charts showing front left quarter view of sight M4.
REFERENCES: TM 9–1535, sec. II; SNL F–1, page 2; SNL F–148; FM 23–90, sec. IV.
TIME REQUIRED: 50 minutes.
I. PRESENTATION:
INTRODUCTION: Lecture—1 minute.
1. Use of sight in field.
2. Statement of objective.
EXPLANATION and/or DEMONSTRATION: Lecture and film strip—20 minutes: demonstration—10 minutes.
1. Description.
a. Name.
b. Use.
c. Components.
d. References.
2. Mechanical Construction.
a. Deflecting mechanism.
b. Head.
c. Body.
3. Optical Characteristics.
DEMONSTRATION BY INSTRUCTOR:
a. Attach sight to mortar.
b. Set elevation to 45°, deflection 0, and level all levels.
c. Set an elevation of 55° by use of the sight.
d. Remove sight.
II. APPLICATION: Demonstration by students—10 minutes.
1. Each student carries out the operations under supervision.
2. Operations to be performed.
a. Attach sight.
b. Set elevation to 50°, deflection 0, and level all levels.
c. Set elevation to 60° by use of the sight.
d. Remove sight.
III. EXAMINATION: Oral Questioning—6 minutes.
1. What Standard Nomenclature List reviews the parts and accessories for this sight?

FIGURE 15.—Lesson plan.

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2. Name the main assemblies of the sight.
3. Describe the operation of the deflection mechanism.
4. By pointing to the instrument, indicate the longitudinal level.
5. By pointing, indicate the collimator.

IV. DISCUSSION: Lecture—3 minutes.
Summarize description and operation of sight.

FIGURE 15.—Lesson plan—Continued.

20. Checking the plan.—*a.* A comprehensive review of the lesson plan before it is used in the classroom is essential. A lesson plan developed for one class may not fit the next class. A change in the entire training program may be called for by a general directive. Unexpected demands on a school or military unit for equipment may require a change in the methods of instruction. A check made by the officer in charge and by the instructor before the lesson plan is used will insure that the plan developed is feasible in terms of the existing training situation.

b. In order to be certain that all important points have been carefully considered in setting up the lesson, the instructor should be able to answer "Yes" to each question given below. If any of the questions must be answered "No," then some phase of the preparation has been inadequate.

(1) Does the lesson deal with one topic only?

(2) Is the number of ideas or procedures small enough to be mastered by the students in the allotted time?

(3) Are the facts presented pertinent to the students at this stage of training?

(4) Has the lesson been built on the previous experiences and abilities of the students?

(5) Is the lesson purpose clearly and concisely stated and its relationship to the course objective clarified?

(6) Does the lesson present some new ideas or procedures?

(7) Has some plan been formulated for getting the initial interest of the student?

(8) Have the importance of the lesson and the reasons for teaching it been brought out in terms of field activities?

(9) Has the relative difficulty of each teaching point been estimated?

(10) Have the steps in the lesson proceeded from known to unknown, from the simple to the complex?

(11) Is the method of presentation the one most suitable to the particular idea or procedure being taught?

(12) Will the necessary emphasis be placed on the important points by repetition, by different methods of presentation, by pauses, and by statements like "Now get this" or "This is important"?

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(13) Have all plans been made for the proper use of training aids?

(14) Is everything in readiness in the classroom: the seats, a suitable location, and the necessary training aids?

(15) Have plans for class participation in the lesson been made?

(16) Have plans been made for applying the information to practical problems or situations and for the procurement of any equipment and assistants required?

(17) Have materials for testing been provided and the procedures and standards of performance determined?

(18) Has an outline, or the procedure for securing the necessary notes for the discussion and critique, been set up?

21. Using the plan.—*a. The lesson plan is a guide.*—It is the instructor's outline for conducting his class. It keeps the pertinent materials before him and insures order and unity in presentation. Having a plan prevents him from "getting off the beam", omitting essential points, and introducing irrelevant materials. Students are quick to appreciate that the instructor has given the same attention to his teaching that he expects them to give to their learning. There is no surer road to teaching success than a carefully thought-out lesson.

b. The lesson plan is not a crutch.—The instructor will seldom hold the plan in his hand, but he will have it available at all times for quick reference. He should never read from it word for word, for when the lesson plan gets in the instructor's way—when the students are more aware of it than of the instructor—the lesson plan loses its value.



FIGURE 16.—The instructor will not read from the lesson plan word for word.

c. The lesson plan is not a substitute for thinking.—(1) If the plan has been prepared by someone else, the instructor should master each step thoroughly before using it. He should make it part of his own thinking before meeting his class.

(2) The instructor must be familiar with all material related to his subject. He should know more than he will ever have time to teach,

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and should know as much about his specialty as any man in the camp. The lesson plan is a skeleton which he should fill out with as many relevant illustrations and practical applications as possible.

d. The lesson plan and materials must be reviewed by instructor before he goes to class.—Few men are gifted with such phenomenal memories that they do not need to refresh themselves on what is to be taught. This review will put the material at the instructor's command, eliminate unnecessary pauses in teaching, and keep the lesson going in rapid-fire order.

e. Lesson plans should be adapted to the class.—If an instructor finds in presenting a lesson that the suggested procedures are not leading to the desired results, he should feel free to change his approach. No matter how careful the planning, it is impossible to predict with complete certainty the reactions of different classes. An approach which has been successful with one group of men may not be equally successful with another. A lesson should be planned flexibly enough so that variations in procedure can be made if necessary.

f. The lesson plan will need constant revision.—No two teaching situations are identical, and the instructor who repeatedly uses the same plan will lower his teaching efficiency and shirk his duty to the Army. He must be as alert to differences in classes and training situations as a combat commander is to changes in the tactical situation.

g. Lesson plans should be kept for future use in revising and improving the instruction.

Section IV

PLANNING MECHANICAL ASPECTS

	Paragraph
Attention and physical comfort	22
Preparation of teaching environment	23
Providing training aids	24

22. Attention and physical comfort.—No matter how interesting the lesson may be, students will not pay attention for long periods of time unless the instructor has taken every step to make the physical conditions conducive to effective learning. Physical aids to interest are important because they are constant factors, present during every minute of instruction.

a. Visual factors play an enormously important role in learning. New factors appealing to the eye must be introduced from time to time, but the instructor must also be constantly on the lookout to counteract or eliminate visual distractors.

(1) The instructor should be able to see every man in the class, and every student should be able to see him. This has an important psy-

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chological effect. It creates directness of contact between the instructor and students. The instructor can keep a check on all the students; and they themselves, being able to observe the gestures and expressions of the instructor, have their interest sustained to a degree not otherwise possible. Being under the constant observation of the instructor also places on them a greater responsibility for paying attention.

(2) Factors appealing to the eye should be introduced frequently. New charts or diagrams should be shown at the point in the lesson which they illustrate, and models for demonstration brought to attention when they are to be used. The instructor, through gestures or meaningful changes of position, can bring new factors into the visual environment to hold his students' interest.

(3) Interest-destroying factors should be eliminated or counteracted. In the classroom, charts and demonstration equipment should be visible only when in use. Outdoors, distractors which cannot be eliminated can be minimized. The instructor should make certain that his class will be held at a reasonable distance from any noise or commotion.

b. Physical comfort is a great aid to learning. No more potent group of interest-destroying factors exists in the classroom than too much or too little heat, too little fresh air, lights too bright or too dim, or chairs which are uncomfortable. Instructors teaching in the field should, so far as possible, consider the physical comfort of their men. Short recesses are necessary at intervals to permit the men to relax. At drill or field exercises it is imperative that the men be given AT EASE during explanations or lengthy corrections. This does not mean that soldiers should be coddled. The soldier expects to be treated as a soldier, but in the interests of the training program, it is the instructor's duty to take every measure to insure that his students are physically, as well as mentally, ready to learn rapidly.

23. Preparation of teaching environment.—Thirty minutes of undivided attention is worth more than a much longer period of half attention and half interest. (See pars. 85 and 86, FM 21–5.)

a. Indoor classroom should be arranged before class (see fig. 17).—(1) The seating arrangement should be such that all students are able to see and hear the instructor and to have an unobstructed view of all training aids used. They should be able to hear the instructor easily.

(*a*) The seats in a typical classroom can be arranged in straight or curved rows.

(*b*) For small classes held in mess halls, the tables can be placed in a U-shaped formation.

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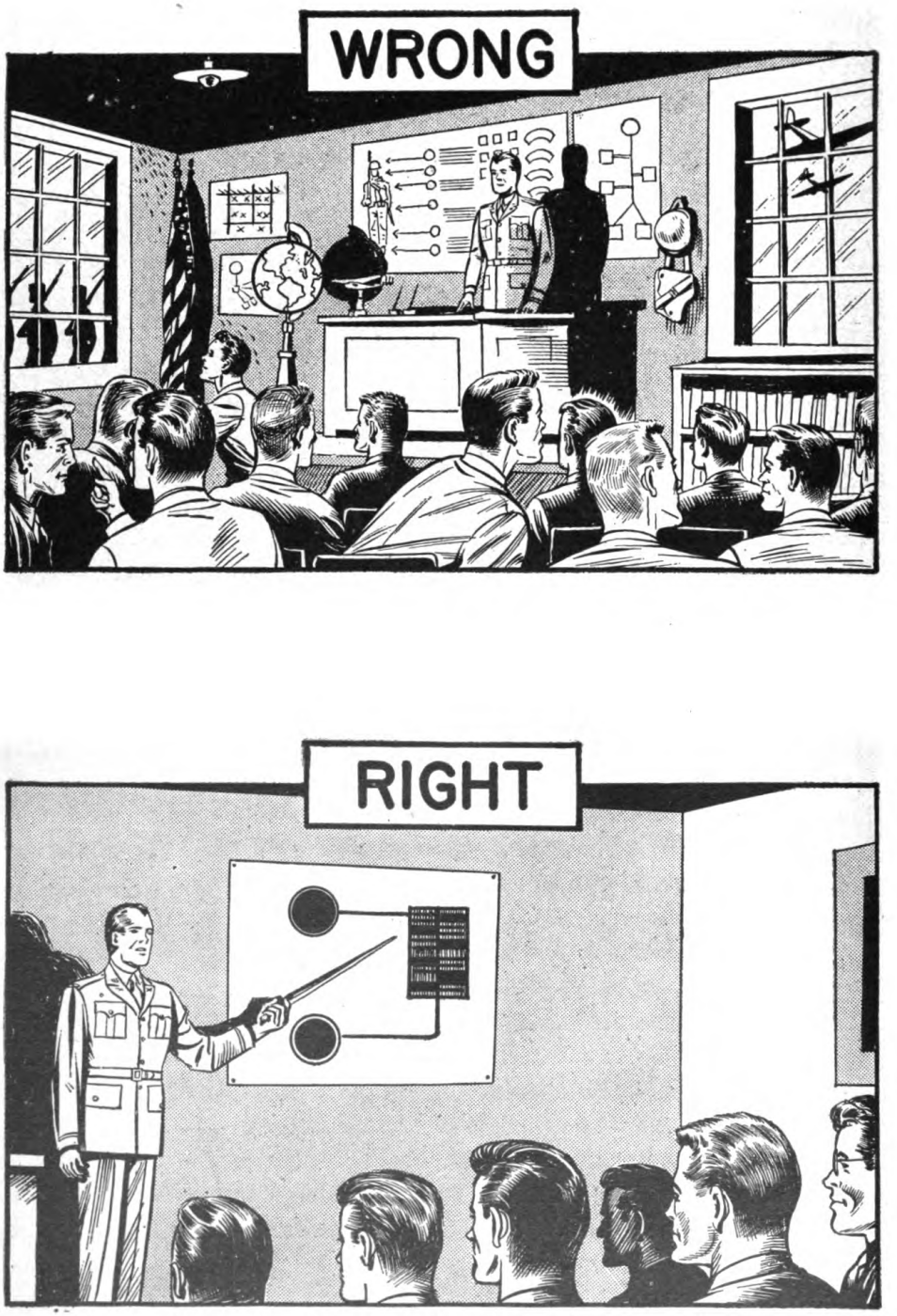


FIGURE 17.—Wrong and right classroom arrangement.

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(*c*) The instructor who uses a U-shaped arrangement should have his charts, demonstration materials, or blackboard at the open end of the U.

(2) The equipment to be used in teaching should be visible from *every seat.* The visual aids and demonstration equipment should be at least 3 feet above the floor. In giving demonstrations, the instructor should have the men arranged so that every student can see.

(3) The lighting in the room should not detract from the presentation.

(*a*) Windows should be either at the side or back of the room. Students should not be placed so that they look into the light source.

(*b*) Charts or models should be well lighted and not obscured by glare or reflections.

(4) The room should be clean, the windows washed, and the walls neat. A dirty or disorderly classroom tends to be associated with slipshod instruction. By setting a good example, the instructor can help teach his men neatness and order.

(5) Proper temperature and ventilation are important.

(*a*) Boredom, so frequently confused with mental fatigue, develops quickly during lessons in rooms that are too hot.

(*b*) Good ventilation is essential. The windows should be open as far as possible without causing drafts.

b. Out-of-doors location should be the best available (see fig. 18).—(1) The terrain features should be chosen so that the class can be arranged conveniently.

(2) The students should be comfortable and able to hear and see distinctly.

(*a*) The wind should be at the instructor's back in order that his voice will be carried to the students.

(*b*) The sun should be behind the students, not shining in their eyes. If shade is available, the students should be placed in it.

(*c*) The students should be arranged in a semicircle close to the instructor.

(*d*) The instructor should use a portable amplifier and a blackboard or easel if such equipment is available and necessary.

(3) The location should be quiet and out of the way of other operations. A location near an air field, motor pool, or another class receiving instruction will make it difficult for the instructor to hold the attention of the class and for the students to hear.

(4) The time required for going to and from the location must be considered, and the necessary transportation facilities provided.

(5) The area selected must be scheduled as far in advance as pos-

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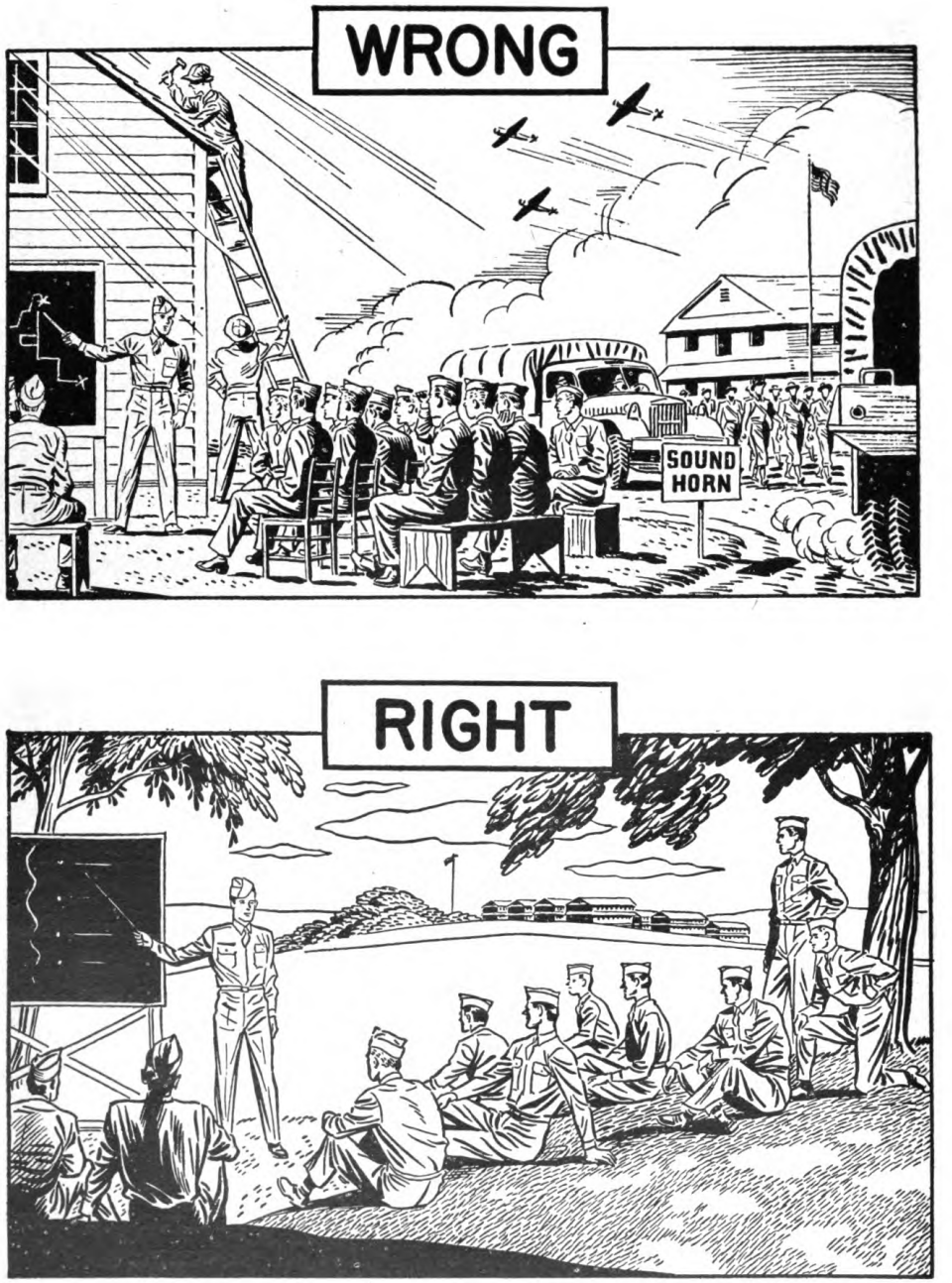


FIGURE 18.—Favorable and unfavorable outdoor teaching locations.

sible in order to prevent conflicts with other demands for the same area.

24. Providing training aids.—Training aids are essential to efficient instruction. Through the use of training films, film strips, blackboard illustrations, charts, maps, models, and actual objects, he can arouse and hold the students' attention in such a manner that

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learning is accomplished efficiently and thoroughly. Soldiers remember things that they both see and hear much longer than those heard only. Through the use of references in publications, the students can study material on which they desire more information or which they have missed because of absence from class. (See ch. 8, pars. 77 to 84, incl., and 87, FM 21–5; and FM 21–6.)

a. Planning for training aids.—(1) Analysis of lessons for points which should be illustrated or demonstrated enables the instructor to decide where visual materials will contribute most to the effective presentation of his lesson. It is important that he plan the use of visual materials in the lesson as carefully as he outlines the points to be taught.

(*a*) Models and actual objects provide essential contacts with Army equipment.

(*b*) Training films may be used to illustrate basic subjects, such as "Personal Hygiene"; technical subjects, such as the operation of the 75-mm gun; and tactical subjects, such as the demonstration of the basic doctrine of combat tactics in the employment of the caliber .50 machine gun by the Cavalry.

(*c*) Film Strips, developed from data in Field and Technical Manuals, are valuable accompaniments to lectures on many subjects, such as the characteristics of infantry weapons, first aid, sanitation, and automotive power transmission units.

(*d*) Blackboard demonstrations are useful both indoors and outdoors in visualizing the points of a lecture or discussion.

(*e*) Charts, made to visualize or explain a fact or an idea, aid in all methods of instruction in basic, technical, or tactical subjects.

(*f*) Maps are useful for indicating operations in relation to terrain features and cities. They are essential in teaching such topics as defilade, scouting, and movements of command posts.

(*g*) Lantern slides may be used to illustrate a variety of subjects such as historical and modern military operations or engine tune-ups. Standard photographs may be used as slides in the delineascope or balopticon projectors.

(*h*) References may be made to manuals such as FM 21–100; reference sheets may be mimeographed for the purpose of outlining such procedures as the operation of a portable water purification unit; and job sheets set up to indicate the steps required in an engine tune-up.

(2) Selection of training aids must be made with several factors in mind:

(*a*) The point to be illustrated and the place in the training program at which it will be employed will determine in part what kind of material is best. Thus, a tactical exercise can well be shown on a

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sand table because it is possible to show troop movements; but a training film on the same subject might also be available. The instructor must decide which will best meet his students' need in view of the teaching situation.

(*b*) The place in which the teaching is conducted will influence the visual materials used. If charts or diagrams are for outdoor teach-

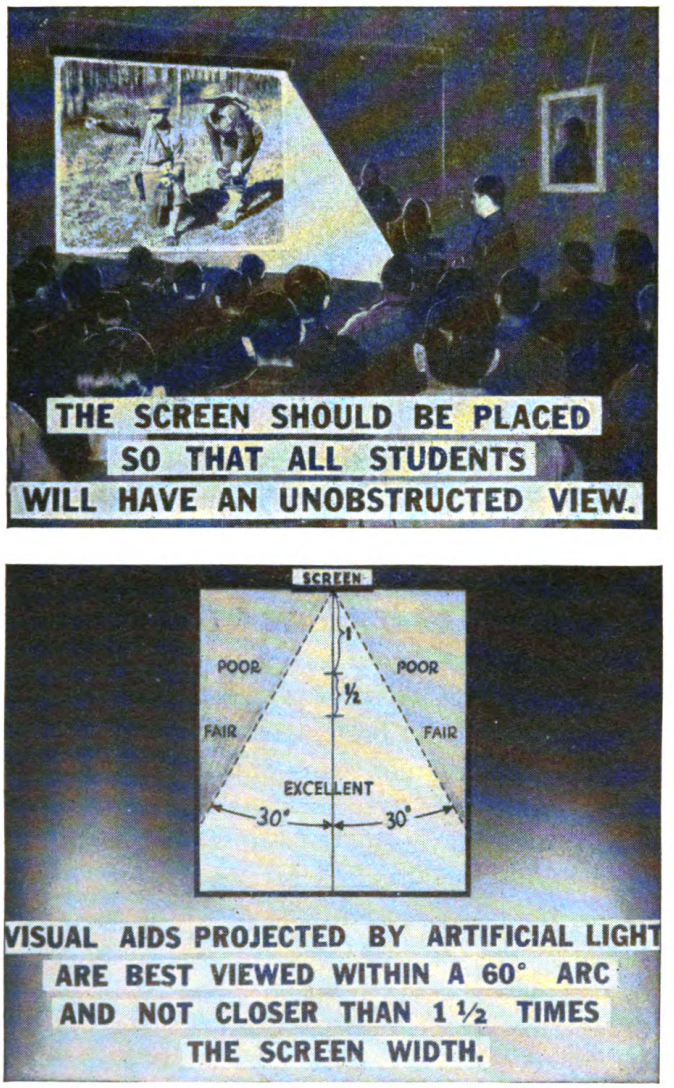


FIGURE 19.—Arranging the screen.

ing, they need to be larger and bolder than those for indoor use. Projected films or film strips can be used only in places where the light is subdued, unless a shadow box is available.

(*c*) The size of the class determines in part which materials are most appropriate. Sand table demonstrations should be used only

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with small groups; a class of 75 men is not able to profit much from them.

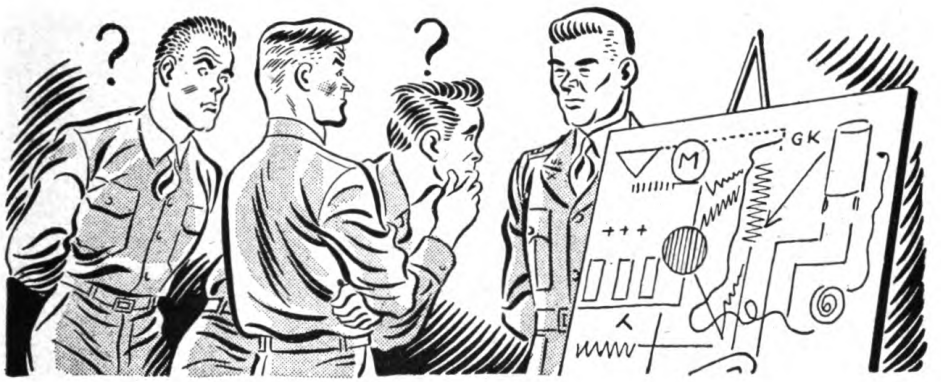


FIGURE 20.—Will the training aids do their job?

(3) Listing the devices will give the instructor an over-all picture of the visual aids he needs for each lesson.

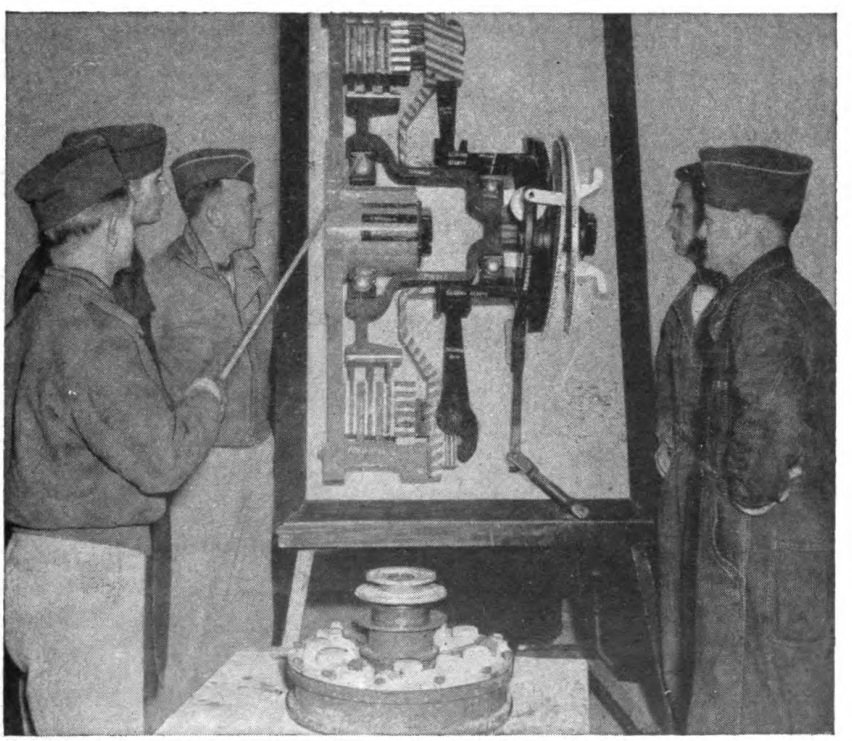


FIGURE 21.—Sectionalized enlarged model of clutch mechanism used in conjunction with object.

(*a*) In preparing such an inventory, FM 21–6 and FM 21–7 will give the instructor knowledge of available films, Field Manuals, Technical Manuals, and technical regulations. Civilian texts, training circulars,

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Army Regulations, manufacturers' manuals, and other training publications will be useful supplements.

(*b*) The instructor should not, however, limit himself to those training aids already prepared by others, but should be alert to possibilities which he can carry out himself, an example of which is the preparation



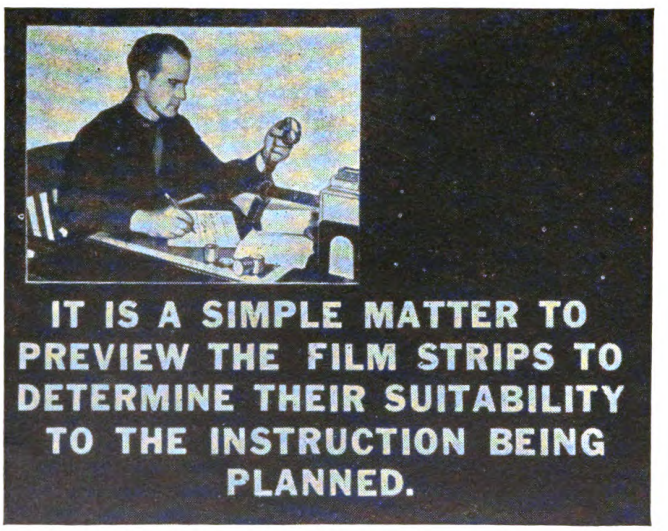


FIGURE 22.—Using film strips.

of small wooden panels for instruction in Air-Ground Liaison Code. Heavy pencil sketches, rough colored drawings on wrapping paper, and charts enlarged from small copies can all be prepared by an instructor who has average drafting ability.

(4) Procurement requires planning in advance of the lesson. The officer in charge should be consulted for available materials and given

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a schedule well in advance of the time the aids are to be used. If new charts, diagrams, and reference or job sheets are to be prepared, complete arrangements must be made early enough in the training program that there will be sufficient time for their preparation.

(5) Checking by the instructor shortly before the beginning of the class is necessary to make certain that all arrangements have been completed. Submitting a request for a training film, a projector, an operator, and a room is not enough; the instructor must check before his class gathers to see that everything is in working order and that his notes on the film or film strip are ready for class use.

b. Providing reference materials (see ch. 8 and FM 21–6).—(1) The instructor should determine which manuals, texts, and information sheets are available to his students, and how many copies of each publication are at their disposal. In many instances, it will be desirable to give each student a mimeographed outline of the essential points of the course. Such supplements are very important in basic and technical courses where each lesson is based on the material of previous lessons. A student who is absent because of sickness or company details can use such mimeographed and illustrated outlines in making up the lessons he has missed.

(2) The instructor should take care of all arrangements necessary to place these materials in the hands of the students. If students can study in the library, they should be informed of this fact.

(3) If students are expected to study outside the class period, it may save time in attaining the objectives of the course to give them help in the techniques of self-study. Many soldiers are not familiar with the most efficient ways of using reference and supplementary materials, and will profit from whatever hints the instructor can give them.

Section V

FINAL REHEARSAL

Paragraph
Rehearsal 25

25. Rehearsal (see par. 92, FM 21–5).—A rehearsal of each new lesson will provide the final check on the instructor's plan. This is of great value to the inexperienced instructor in giving him confidence in his teaching, but experienced instructors should also rehearse their lessons.

a. The rehearsal should be complete in every respect, with exact charts to be used, the demonstration to be performed, and the order of presentation.

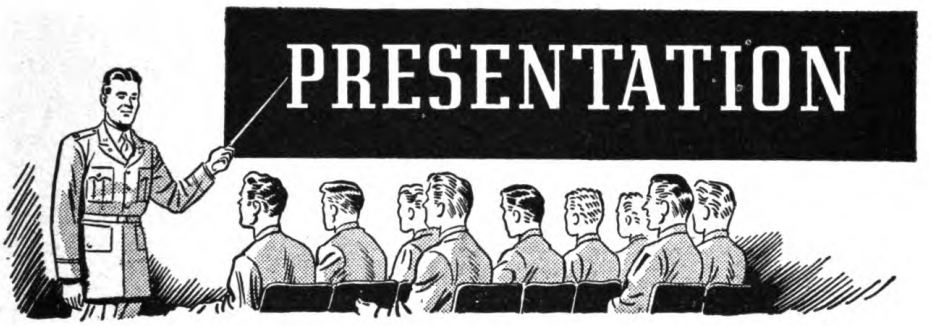
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b. The rehearsal provides a thorough check on the usefulness and arrangement of the visual aids and will often suggest improvements of position or order.

c. An audience of one or two officers or soldiers should be arranged. If possible, these should be of superior or equal rank with the instructor. They can provide constructive criticism on such points as the instructional order of material, choice of words, rate and volume of speech, and effectiveness of questions and demonstrations. The instructor who attempts to justify his shortcomings or to argue over criticisms which are honestly given, places himself at a decided disadvantage over those who are adaptable.

d. It is essential that rehearsals for demonstrations be repeated until each step is easily performed and properly timed. The instructional value of a demonstration is reduced whenever certain phases are speeded up because of improper timing; students are usually aware of such poor preparation.

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CHAPTER 3

PRESENTATION

		Paragraphs
SECTION I.	General	26–30
II.	Introduction	31–32
III.	Explanation—lecture	33–36
IV.	Explanation—directed discussion	37–41
V.	Explanation—illustration	42–44
VI.	Demonstration	45–48
VII.	Expediting learning	49–53

SECTION I

GENERAL

	Paragraph
Presentation	26
Steps in presentation	27
Beginning the class	28
Administering the class	29
Importance of interest in learning	30

26. Presentation.—This is the second major stage of instruction. In it the materials, carefully prepared beforehand by the instructors, are presented to the students. Here the effectiveness of planning and preparation are put to the test; here, frequently, even in the most carefully laid plans, adjustments to the reality of the teaching situation must be made.

27. Steps in presentation.—*a. Introduction.*—The first few minutes of a class are given over to the introduction, in which the interest of the students is aroused, the lesson objective made clear, and the lesson related to what the students already know. (See pars. 31 and 32.)

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b. Presentation.—This is the actual presentation of the teaching material to the class. The instructor explains and demonstrates the materials necessary to achieve the objective of the lesson. The presentation may be made in several ways, such as—

(1) Explanation, which includes lecture, directed discussion, and illustration (see pars. 33 to 44 incl.).

(2) Demonstration (see pars. 45 to 48, incl., pars. 66 and 67, FM 21–5).

28. Beginning the class.—*a.* From the moment the instructor enters the classroom or joins his men in the field, the instruction should

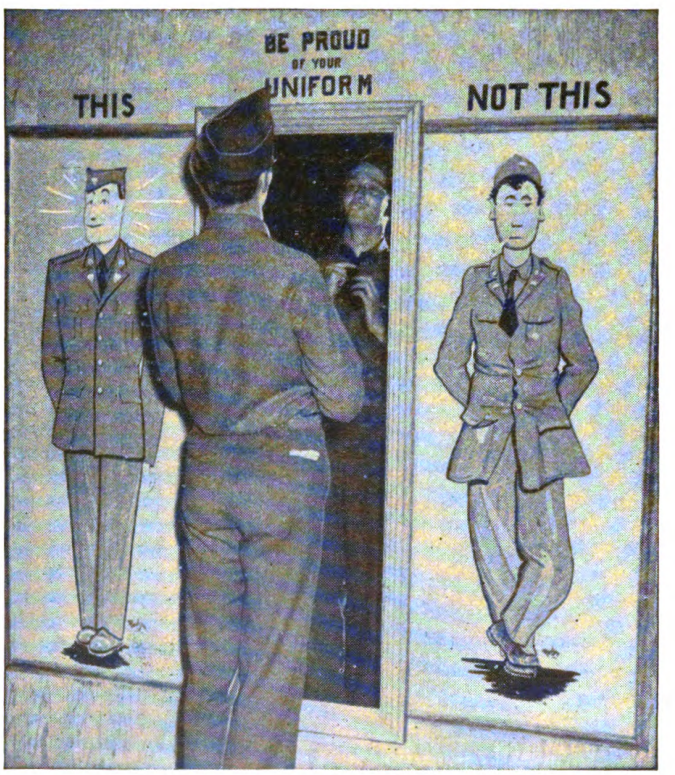


FIGURE 23.—Appearance is important.

move forward in an efficient, military manner. Students react to the appearance and bearing of an instructor. If he is dressed neatly, carries himself well, moves and acts with snap and precision, the class will tend to take on that character. If, on the other hand, the instructor is poorly dressed, slow of movement, and indefinite in his decisions, the students will follow his example. The class should be started promptly, and the preliminaries, such as roll call and announcements, accomplished briskly.

b. A class period should be a good "show," not in the sense of a dramatic exhibition, but as a satisfactory performance. Everything

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should be in readiness—the class situation, equipment and teaching aids that are used, assistants, and particularly the instructor himself. By judicious placement of the stand for his notes and the equipment and teaching aids used, by considering them in relation to the seating arrangement and the walls, and by careful lighting, the instructor can heighten the effectiveness of a class meeting. Every good teacher is something of a showman. (See pars. 22, 23, and 24.)

c. Stage fright is the most frequent source of poor showmanship. It has been estimated that 80 out of every 100 instructors experience some degree of stage fright when they start a lesson.

(1) Tenseness and self-consciousness, often called stage fright, are, in general, desirable characteristics. They signify mental and physical energy, which when controlled, will give life, vitality, and enthusiasm to the instructor's presentation.

(2) Every instructor should know that stage fright is due to inexperience. This feeling is natural, but is no excuse for a poor performance. Army leaders must be able to think and act in new situations. The instructor should realize that his students are willing to give him a break. Napoleon once said, "I am not afraid to talk to any one of my men alone. Why should I be afraid to talk to a group of them?" Each instructor should acquire this same attitude.

(3) An inexperienced instructor should realize that speaking before a group becomes easier with practice. As he gets to know his men and develops skill in presenting his lessons, the instructor will find that his stage fright will diminish.

(4) Stage fright can be controlled:

(*a*) The first step in overcoming stage fright is careful planning of the lesson and thorough mastery of the subject matter.

(*b*) The second step concerns beginning the class. Proper timing is essential and requires practice. The new instructor has a tendency to rush. He should realize that he has plenty of time. Before starting to talk, he should look over the class and take a deep breath. The first meeting of a class can be started by writing the subject title and the name of the instructor on the board. Presenting a well-performed demonstration, asking a good question, or carrying out some routine activity such as checking the class roster or writing the lesson objective on the blackboard are desirable ways to start the ball rolling.

(*c*) The third step toward overcoming stage fright is to keep in mind the objective of the lesson and the fact that the class is there to learn. An instructor should realize that he is there only to help make expert soldiers of his students. The men are more interested in the subject than in the instructor. He is not on exhibition.

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29. Administering the class (see pars. 93 and 94, FM 21–5).—*a. Class routine.*—(1) Check classroom and equipment. Before the class begins the instructor should check on all class arrangements. He should see that the room is in order, that the equipment to be used is ready for use.

(2) Begin and end the class promptly. The time of the men should not be wasted at the beginning of the period. At the end they have other obligations to meet, and these should be honored.

(3) Check attendance at beginning of class. Call again the name of any man who does not respond to the first reading of his name. The instructor may not have heard his answer. At the end of the roll call, ask if any man is present whose name has not been called. If more than one man in the class has the same surname, read the initials of each along with the surname.

b. Class practices.—(1) The class period should move forward at a steady pace. There should be no awkward pauses between various parts of the lesson as this betrays poor preparation and allows the interest of the men to lag.

(2) In general, instructors should stand during the lesson period. However, if classes are small and it is desired to encourage informality (for example, around a conference table), it may be preferable for instructors to remain seated.

(3) In general, when students in a class are asking or answering questions, they should be required to stand and speak to the instructor and to the entire class. At times it may be advisable in the interest of better instruction to forego this requirement, especially when classes are small and of an informal nature, or when a large part of the instruction is individual, such as, scouting and patroling, or rifle marksmanship.

(4) All the students in the class are soldiers or officers. Enlisted men are to be referred to as soldiers and are not to be called recruits, selectees, draftees, or any other similar term. Officers are addressed by title, or collectively as gentlemen.

(5) The instructor should look at the class, not out of the window, or at an object in the back of the room, or at his notes. The instructor must talk during the lesson to a man on the back row, on the front row, on the right side of the group, and on the left side of the group.

(6) When questions are asked by students in the class, care must be taken to insure that all members hear a question. Rather than repeating a student's question, the instructor should ask the student to repeat it, "in order that we may all hear the question."

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30. Importance of interest in learning.—Many instructors wonder why they should be concerned with arousing student interest. The reason is that without interest, learning will be slow and inefficient. Before a man is willing to expend time and energy on a job and before he exhibits interest, he wants to know how it will benefit both the Army and himself. One of the instructor's principal tasks, then, is to present his subject so that its practical value is readily apparent. In addition, by his enthusiasm for and complete command of the subject, by his understanding of the ways in which students learn, and by techniques discussed in the following paragraphs, the instructor can greatly stimulate his students' will to learn.

SECTION II

INTRODUCTION

	Paragraph
Purposes	31
Characteristics	32

31. Purposes.—An introduction to an explanation or demonstration serves three purposes:

a. To arouse interest.—The introduction can do much to arouse or kill interest, for in it the instructor sets the stage for the presentation. A pointed story or a personal experience will enlist the students' attention and orient them for what is to follow.

b. To relate the lesson to preceding instruction.—In the introduction the instructor should show how this lesson is related to previous instruction.

c. To clarify the objective.—Stating the lesson objective is the first step in orienting a class toward the learning goal. Once the students know what they are expected to learn they can devote full attention to the presentation.

32. Characteristics.—*a. Brevity.*—Introductions must be brief. They will vary in length according to the teaching situation, but they should not take any of the time required for the presentation. If 30 minutes are allotted for the lesson, not more than 2 or 3 minutes should be used for introducing the subject matter. If 50 minutes are allotted for the lesson, never more than 10 minutes, and generally not more than 5, will be used for the introduction.

b. Clarity.—In introducing a lesson, the instructor should tell his students *what* is to be taught and *why* it is to be presented. This should be done as clearly as possible.

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SECTION III

EXPLANATION—LECTURE

	Paragraph
The lecture as a teaching procedure	33
Technique of lecturing	34
Cautions in use of the lecture	35
Summary	36

33. The lecture as a teaching procedure.—The lecture is perhaps the most common method of instruction. Its frequent and continued use in the Army, in schools, and over the radio indicates that it has been found to possess many values, the most important

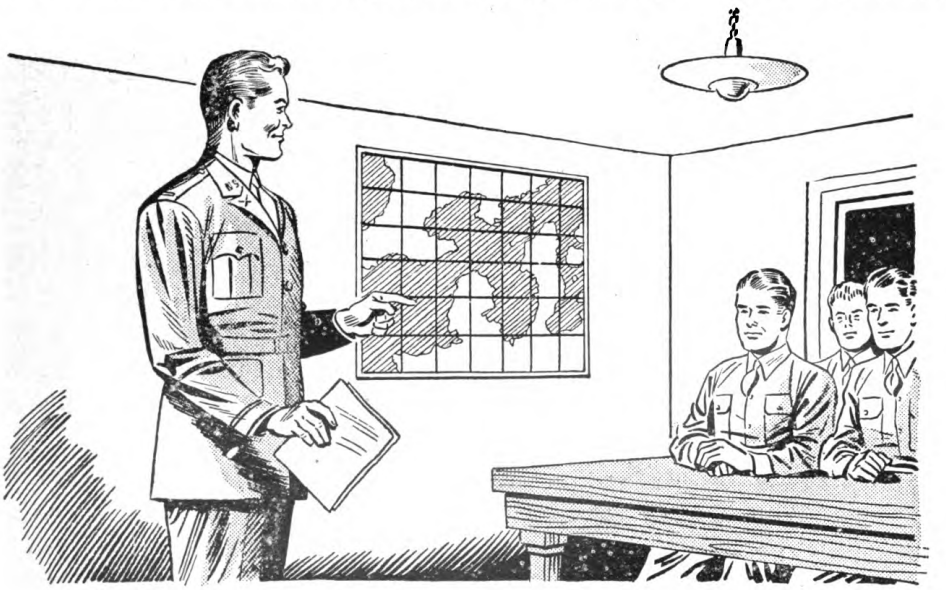


FIGURE 24.—The instructor should have military bearing and appearance.

of which are discussed in the following paragraphs. (See par. 95 to 103, incl., FM 21–5.)

a. Many ideas can be presented in a short time.—Words are the most common means of transmitting ideas. Although things seen are sometimes more impressive than those heard, our system of communication rests largely on spoken and written words. Ideas, expressed in words, can be organized concisely and logically in a lecture, and presented to an audience in rapid sequence.

b. Lectures can be given to large groups.—The only restriction on the size of a lecture audience is the carrying power of the speaker's voice and this limitation is overcome when a public address system is used. A forceful speaker can instruct hundreds or thousands of men at one time. Naturally, most lectures are given to smaller groups but, with the exception of the motion picture, no teaching

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technique is so well suited to large numbers of people as the lecture.

c. Lectures can provide basic material.—Lectures are useful in bringing soldiers with varied backgrounds to a common understanding of relevant facts, principles, and attitudes. Familiarizing new recruits with the fundamentals of such broad subjects as Articles of War, personal hygiene, and military courtesy, or with more technical subjects such as signal communication is quickly accomplished by means of lectures. Bridging the gaps between what students know and what they are expected to learn and orienting them to new ideas and skills can also be expedited through lectures.

d. Lectures are effective introductions to directed discussions.—Worthwhile discussions are possible only when a class knows something of the subject matter and is in readiness to discuss it. Lectures are one means of preparing a class for a directed discussion.

e. Lectures can give direction to demonstrations.—Few, if any, demonstrations are meaningful unless preceded by a lecture, however brief, in which the students are informed of what they are to see. A demonstration sprung on a class without an adequate introduction seldom leads to satisfactory achievement of the desired goals.

f. Lectures can be used to summarize materials rapidly.—Because of the speed with which ideas can be presented in a lecture and the large number of persons to whom it can be addressed, a lecture is an ideal teaching technique for summarizing large phases of instruction.

g. Effective lectures are brief and well illustrated.—Long lectures, or those not illustrated, usually defeat their purpose. Those which are brief and well illustrated do not permit boredom to occur. Few lectures in basic or specialist subjects will be longer than 15 minutes. The use of illustrative materials to add variety and to clarify the major points is discussed in paragraphs 42, 43, and 44 and in chapter 8.

34. Technique of lecturing.—Students react to *what they see*, *what they hear*, and *what they understand.* Because an instructor is seen, he must make certain that he meets military standards of bearing, neatness, and bodily control; because he is heard, he must be sure that his voice and manner of speaking are suited to the size and location of his class; because he is to be understood, he needs to make his lecture clear.

a. An instructor is first seen.—The manner in which the instructor carries himself and wears his uniform makes an indelible impression upon the class. He should have the following characteristics:

(1) *Military bearing.*—An erect posture and a self-confident attitude are an Army instructor's initial requisites. Through them he

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FIGURE 25.—Mannerisms to be avoided.

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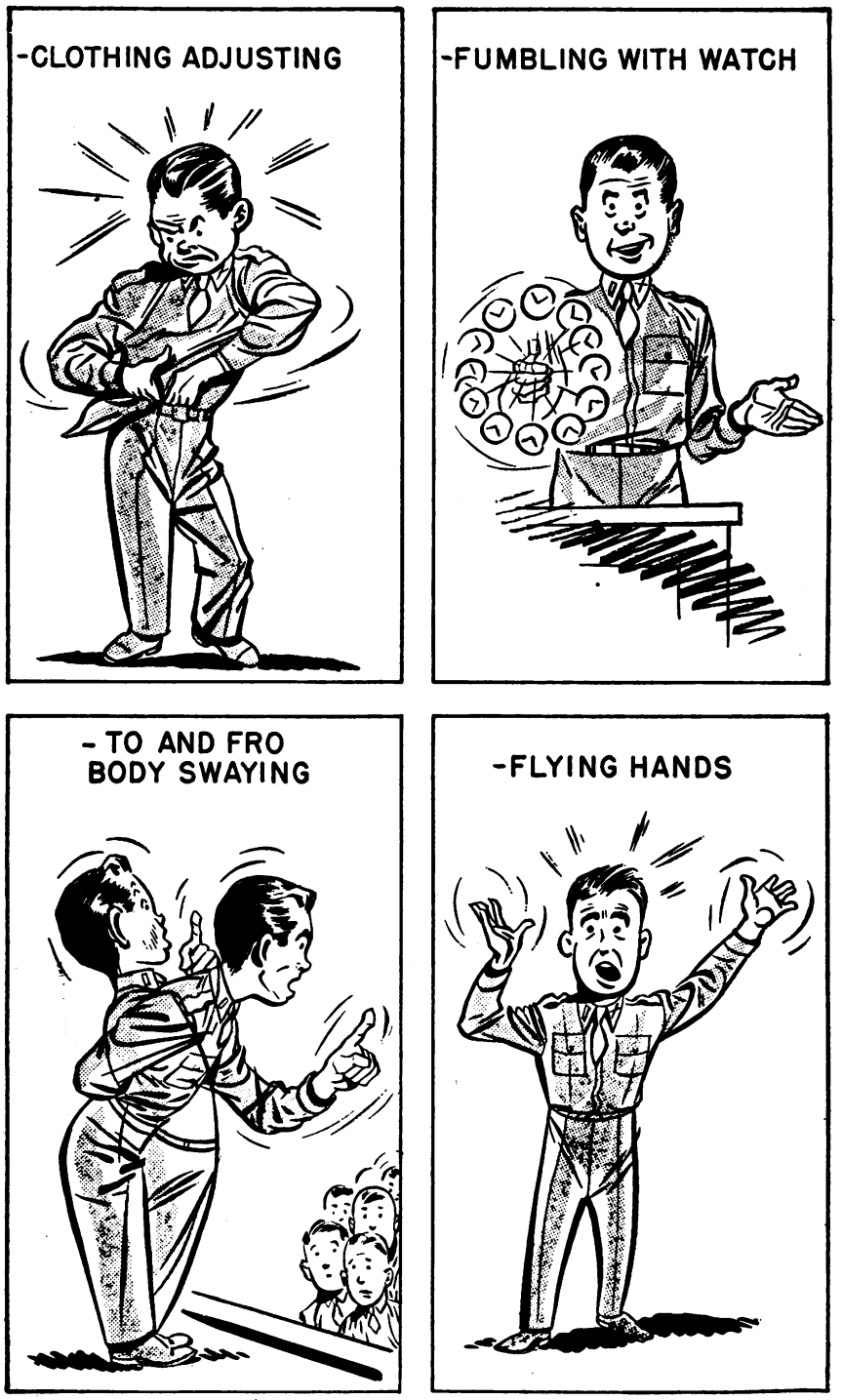


FIGURE 25.—Mannerisms to be avoided—Continued.

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conveys to his students that he is capable of handling the teaching situation.

(2) *Neatness.*—When teaching, the instructor should be a model of neatness, for he is on inspection before his students.

(3) *Physical coordination.*—As a physically fit soldier, the instructor should appear enthusiastic and alert, but not tense or nervous. During the lecture, purposeful movement will express his zeal for the subject and will give emphasis to important points.

(*a*) Gestures are essential. They bring vitality and variety to a lecture; without them, the speaker seems stiff and unnatural. There is only one important rule: *Make the gestures meaningful.* Use them only when there is a need. Gestures should call attention to the subject, never to themselves. Each instructor will find that certain gestures seem natural to him, and these are the ones he should use.

(*b*) Mannerisms should be avoided. Mannerisms are movements that divert interest from the subject matter. They call attention to themselves rather than to the lesson. For some of the common mannerisms to be avoided see figure 25.

b. The instructor is then heard.—The instructor's voice is his best teaching weapon, for it is his most direct means of communication with the class. A few individuals are born with excellent speaking voices, but most men have to cultivate theirs if they are to develop skill as lecturers. The following are factors in a good speaking voice:

(1) *Voice quality.*—Each instructor has an individual voice quality which it is his duty to make pleasant to his listeners. A high, shrill, or rasping voice can be lowered and softened; a voice which is excessively deep and booming can be modulated. Talking through one's nose or swallowing words can be overcome through practice.

(2) *Volume of voice.*—The lecturer should speak loudly enough for every man to hear him, but he should raise his voice beyond that point only for emphasis. In a small classroom, he can speak as in ordinary conversation; in a lecture hall he must talk with greater volume; outdoors he will generally find it necessary to talk even louder. But it should be remembered that variety is a requisite in every lecture. Monotony puts the listeners to sleep. At times, it will be effective to speak so softly that the men must listen intently. When an important point is being made, increased volume will give emphasis. Thus, the instructor should adjust his voice to the place in which he is speaking, and should vary it to give emphasis to the lecture material and to keep the attention of the class.

(3) *Rate of speaking.*—Frequent changes in rate of speaking are as important as changes in volume. If the instructor talks faster than 160 words per minute his students cannot keep pace with him.

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If, on the other hand, he talks slower than 90, not enough is said to hold their interest. Over-rapid delivery confuses, and over-deliberate delivery irritates.

(4) *Pauses.*—They should be definite and planned. Clean breaks bring variety and interest. Pauses, however, should not be confused with hesitation caused by uncertainty.

(*a*) Pauses should punctuate, not mutilate.

(*b*) Pauses should come at important points.

(*c*) Pauses should be clean and decisive. The deadly "Er-r-r" or "Ah" should be stricken from the lecturer's vocabulary.

(5) *Enunciation.*—The instructor should enunciate each word as definitely and smartly as he gives a salute. He must avoid slurring,



FIGURE 26.—The instructor should avoid being too technical.

swallowing, or mumbling. A word unheard or misunderstood is a lost word, resulting in less learning.

(6) *Naturalness.*—Don't "orate"! Don't shout! Don't whisper! These are rules worth observing. Successful lecturers appear to be speaking naturally, often giving the impression that they are in conversation with their audience rather than orating to them. Lecturers who seem to be one of the group enlist the sympathetic interest of their listeners.

c. The instructor is understood.—Successful instruction depends on how well the class understands the instructor. Without understanding, there is little or no learning. Certain valuable principles of planning and delivering lectures should be followed in order to heighten this understanding.

(1) *Lectures should have a definite organization.*—Each lecture should have—

(*a*) A beginning in which the aim is clearly and interestingly stated.

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(*b*) A developmental section in which the new materials are presented.

(*c*) A summary or brief final statement of important points.

(2) *Lectures should be adapted to the educational and intellectual level of the class.*—Talking over the heads of students and talking down to them are common faults of lecturers. Learning all one can about the students' backgrounds and abilities before giving a lecture will repay many times the efforts required. With practice, the instructor can tell from the students' facial expressions and attention the extent to which they are following his presentation. The sincere instructor never tries to dazzle his listeners; instead, he shows them that, while he is master of his subject, his primary interest is in helping them learn. To that end, he relates everything he says to his students' interests, attitudes, and abilities.

(3) *Lectures should move forward smoothly.*—Once the attention of the listeners has been aroused, the most effective way to hold it is to develop thoughts in logical sequence. Each new point should be definitely related to the theme of the lecture and to the preceding points. The skillful instructor never allows himself or his students to get lost in a maze of seemingly unrelated ideas.

(4) *New material should be introduced after previous points are mastered.*—Introducing a new principle before fundamentals previously presented our mastered confuses students and hinders their learning. Each phase of the lecture must be clear to the students before the instructor can safely assume they are ready for further material.

(5) *Specific applications make points meaningful.*—Broad generalizations and abstract principles are seldom understood or applied unless the instructor makes specific applications. Soldiers are interested in knowing just how, when, and where they are to use what they are told or shown. One pointed story is worth 10 minutes of generalized talk. Visual aids, too, play a major role in providing the instructor with specific illustrations for his lesson. Charts, maps, films, and other training aids are part of the lecturer's resources in communicating facts and ideas, as visual materials are often more readily understood than words.

(6) *The instructor's speech should be clear and direct.*—If the instructor is to be understood, his words must be chosen carefully and his sentences developed clearly and logically. (See fig. 27.)

(*a*) *Choice of words.*—The right word in the right place is the keynote of effective speech. Verbal communication depends on using those words which have the exact shade of meaning needed to make

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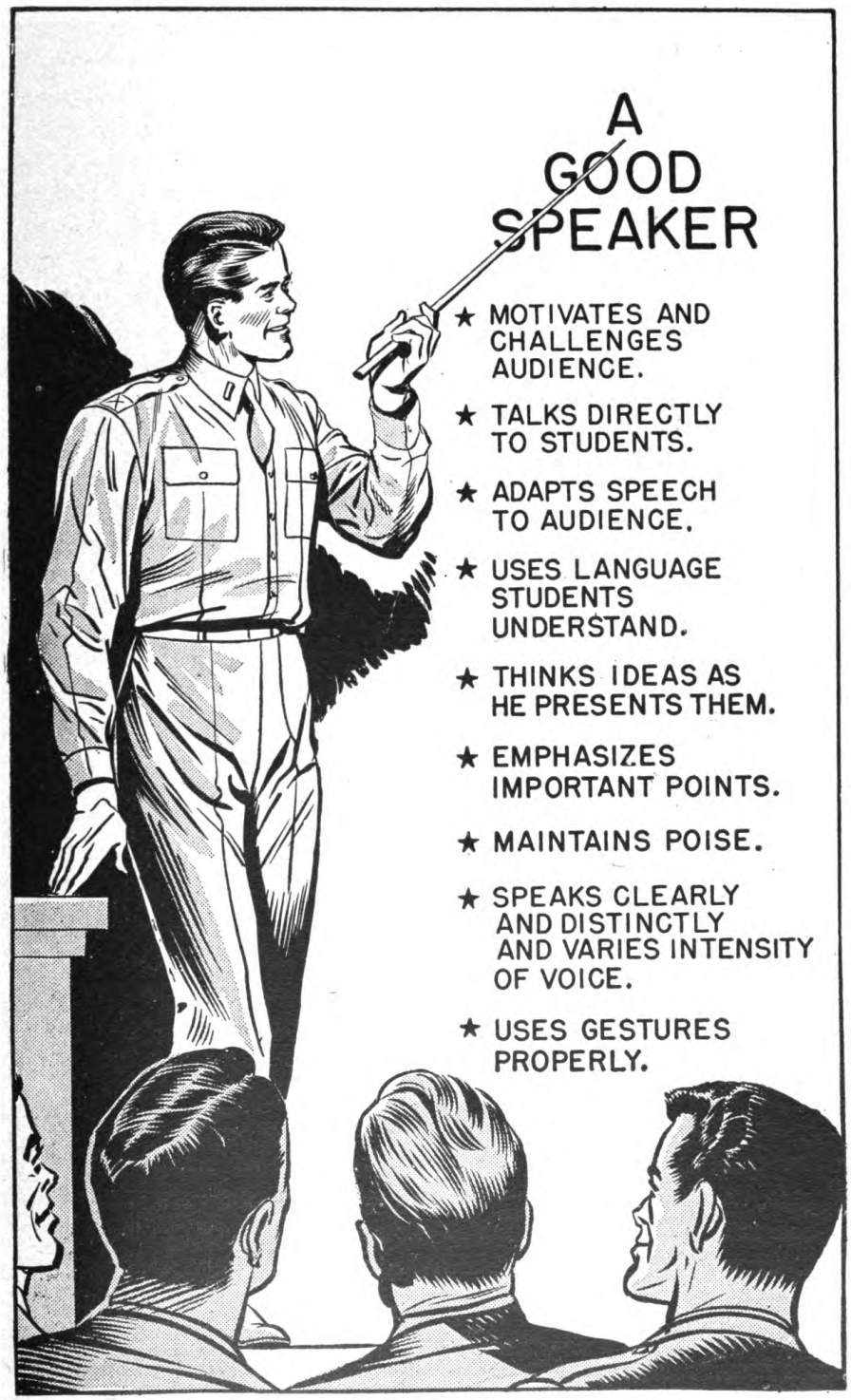


FIGURE 27.—An instructor should be a good speaker.

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the thought clear. Each should contribute to the clarification of the idea. The instructor should use—

1. *Short words.*—Use long words only when there is no appropriate shorter term.
2. *Familiar words.*—Words which every man in the class understands will promote learning. This does not mean that the instructor should use overworked terms and expressions. He should develop a large, but understandable, vocabulary to keep his lectures interesting and clear.
3. *Concrete words and phrases.*—Concrete, specific terms show sharp, clear thinking; vague terms are evidences of vague thinking. Instead of saying "The objective is that house over there," say, "The objective is that white house to the right of the clump of pine trees and in front of the hill."

(*b*) *Sentence structure.*—Sentences should be constructed as carefully as words are chosen. The words should fit into their places as neatly as the utensils in the soldiers' mess kits. The instructor should—

1. *Use short sentences.*—Those that are long and involved are hard to follow. When a sentence begins to crumble under its own weight, use a period and start a new one. Each should contain not more than one or two ideas; three or four in the same sentence are confusing.
2. *Vary the form of sentences.*—Beginning every one with "the" is deadly. Make some short; others longer.
3. *Provide transitions from one sentence to the next.*—The idea in one sentence should be related to the ideas in those which precede and follow. Connectives should be appropriate and varied. "And" is not the only word to fasten two parts of a sentence together. Some useful connectives are "accordingly," "consequently," "furthermore," "however," "likewise," "moreover," "nevertheless," "then," "therefore," "while."

(7) *The important points deserve a summary.*—At the end of each lecture, the instructor should sum up in concise form what he expects the class to know. Driving home the salient ideas at the end is as important as arousing interest at the beginning.

35. Cautions in use of the lecture.—*a. Presenting too much material too rapidly.*—The enthusiastic instructor may present his subject more rapidly than his students can absorb it. The learning which results from lectures is not easy to check while the lecture is in progress; and unless considerable caution is exerted, the instructor may make unwise assumptions about the progress of the class.

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b. Forgetting the students.—When the lecture technique is used, there is a tendency for the instructor to become so interested in what he is saying that he forgets his students' backgrounds and attitudes. Loss of student interest is the result.

c. Neglecting to develop public speaking techniques.—A lecture often is little more than a dry recital of facts. It should be an interesting presentation, an occasion to which the instructor should rise. Excellence in public speaking lends assurance that a lecture will be effective.

d. Failing to vitalize lectures.—It is often necessary for an instructor to give a lecture on the same subject many times. Unless it is continually improved and revised, there is a tendency for the lecture to become dull and routine. Even the instructor loses interest, but not, unfortunately, until some time after he has lost his students' attention. Altering the content and organization of a lecture, bringing in new illustrations and stories will kindle the interest of both the students and instructor.

e. Failing to use visual aids.—Lectures should be illustrated with charts, diagrams, blackboard illustrations, films, models, and the like. Such training expedients require advance planning and are sometimes cumbersome to handle. This, however, is no excuse for failing to make a lecture something more than a merely verbal presentation.

36. Summary.—Obviously, a course of lectures only would not go far toward instructing personnel in their military duties, since demonstrations, discussions, and applicatory exercises of a practical nature are essential. Neither would it be the best use of the available time, because the same amount of learning could be accomplished more forcibly by means of a combination of talks, practical work in the field or classroom, and assigned outside work. Lectures, however, when properly used will speed up instruction to a marked degree, will clarify points not previously understood, and will provide summaries.

Section IV

EXPLANATION—DIRECTED DISCUSSION

	Paragraph
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37. Directed discussion as a teaching procedure.—*a. Definition.*—In the discussion, sometimes referred to as the conference,

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students are given an opportunity to participate directly by raising questions and by answering those put by the instructor. Thus, the chief difference between a discussion and a lecture is the emphasis on student participation in the former. A discussion held at the end of an applicatory exercise is generally called a critique (see ch. 6). Directed discussions may be used in all types of lessons. (See pars. 70 to 73, incl., FM 21–5.)

b. Purposes.—A directed discussion can be used—

(1) To supplement lectures, shop or field exercises, and assignments by asking the students specific questions to determine whether they understand:

(*a*) *What* they are to do.
(*b*) *Why* they are to do it.
(*c*) *When* they are to do it.
(*d*) *Where* they are to do it.
(*e*) *How* they are to do it.

(2) To prepare students for the application of doctrines or procedures to specific situations.

(3) To sum up and clarify the important points developed in previous instructional steps. By means of questions, the instructor makes certain that every man understands the major points.

(4) To introduce new materials and set the stage for subsequent work.

38. Technique of conducting a directed discussion.—*a. Preparation.*—Like all other techniques of instruction, the directed discussion depends for its success upon careful preparation. The instructor must always prepare the principal questions, problems, and teaching points in advance. He must be certain that his students have a background of experience and information that will enable them to discuss the subject intelligently.

b. Responsibilities of instructor.—In addition to the qualities required of the lecturer, the discussion leader must possess special abilities and skills. He should, for example, be particularly alert—quick to analyze the attitudes and difficulties of the students. He must maintain an objective, impartial, fair point of view when weighing the suggestions and questions advanced by members of the class. At times he must exercise patience and self-restraint, as when a student raises for consideration points which the instructor believes have already been adequately presented. The instructor must never use sarcasm or ridicule in these situations. If the student asks a question in good faith, the instructor should give a straightforward answer. He must be a leader in the best sense of the term in that

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he must guide the discussion toward the objective of mastery of the lesson. In conducting the discussion, the instructor should encourage the students to participate in order that they may learn to think out what they have been taught.

c. Suggestions for the instructor.—In a discussion the instructor should—

(1) Introduce the subject and get the discussion started. One good question, one pointed story, a brief explanation, or a simple demonstration will start the students thinking.

(2) Build upon a foundation of previous student information or experience. In keeping the discussion rolling, the instructor's questions must be phrased not only in terms of the points already pre-



FIGURE 28.—A discussion may confuse students if it is not summarized.

sented in the lesson, but also in line with the information and experiences resulting from the student's previous training.

(3) Maintain a balanced discussion by all students. Spontaneous participation should be stimulated at the outset and maintained throughout the discussion. The instructor should encourage *all* members of the class to participate. In this way he can keep track of the progress each student is making. The hesitant student can be encouraged by asking him relatively simple questions in order to increase his confidence.

(4) Hold to the central theme throughout the discussion. Irrelevant discussions and questions should be eliminated. If a student carries the discussion from the lesson objective, the instructor must guide him back to the central theme. A point which is to be considered in later lessons can be put off until a more appropriate time

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by the instructor saying, "That is a good point which we will take up later." Summary statements at regular intervals will keep the discussion related to the lesson objective.

(5) Develop skill in the art of questioning. Much of the success of the discussion method can be attributed to the instructor's skill in questioning. He should remember that it is the student who is developing the ideas and that the instructor is simply guiding that development. *The instructor should ask questions instead of answering them. When a student raises a question, the instructor should call upon another student for the answer.*

(6) Summarize the materials covered. At the end of the discussion, the important points covered and the principal conclusions established should be summarized. Failure to use this summary technique may leave students feeling confused.

39. Questioning technique in a directed discussion.—Successfully directed discussions demand effective questioning by the instructor. Factors which influence the success of questioning are the uses, the form, and the distributions of questions among members of the class.

a. Uses to which questions are put.—Questions may be used to—

(1) Arouse interest.

(2) Claim the attention of inattentive students.

(3) Direct the thinking of students.

(4) Lead students in analyzing the steps in a process.

(5) Discover individual student weaknesses or gaps in learning.

(6) Determine understanding of instructions and assignments.

(7) Test the effectiveness of teaching.

b. Characteristics of an effective question.—Questions should—

(1) Have a specific purpose. Merely asking, "Are there any questions?" is seldom worth while. If the instructor is interested in seeing whether or not the students understand some phase of the lesson, he should phrase a definite question involving the principles or facts he has been teaching.

(2) Be "clear cut" and understood by all students. Avoid using terms with which the students are not familiar. If it is apparent that the students do not understand the question, it should be rephrased in language they know.

(3) Be suited to the level of ability of the class.

(4) Contribute to the progress of the lesson. Every question should carry the class toward the lesson objective. Avoid asking questions which are likely to lead away from the subject under consideration.

(5) Emphasize one point. Avoid asking two questions in one.

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(6) Be phrased in such a way that a definite answer is required. Do not allow students to bluff. Instead of asking, "What do you think are the main features of a fuel supply system?" ask, "What is the purpose of each unit of the fuel supply system of a truck?"

(7) Not require an answer in the words of the text or the instructor. Asking questions which demand only the memorizing of verbal phrases does not cause students to think.

(8) Be phrased so as to discourage guessing. *Avoid asking questions which require a "Yes" or "No" answer.*

c. Asking the questions.—(1) *The instructor should put the question to the class, pause, and then call on a student to answer it.* This stimulates each student to formulate an answer and secures the attention of the class, since no one knows who will be called upon to respond.

(2) The questions should be distributed among the members of the class. The superior students should not be asked all the questions, nor should the students be called on in the same order each time. A good procedure is to have a checklist of the students in each class on which the instructor places a mark after the name of each student questioned.

(3) Questions should not be repeated for the benefit of inattentive students.

d. Answers to questions.—Student's answers should meet certain standards.

(1) A student's answer to a question should be heard by the other members of the class.

(2) Answers given by students should not be repeated by the instructor. If he does this, the students form a habit of speaking to him rather than to other members of the class.

(3) Answers should be direct and meet the requirements of the questions exactly. Some answers go all around the point raised by the question but do not answer the question at all.

(4) Answers should indicate that the student understands the materials involved and is not merely answering on the basis of having memorized something he has read or heard.

(5) Concert answers by the class should be avoided except in rare cases when this technique is used for the purpose of providing practice.

(6) Good answers deserve recognition. Compliment the student who gives a good answer to a question and encourage him. Do not always say, "All right" when a student answers a question well; use other phrases such as "Very good," "That is a good point."

40. Advantages of discussion method.—*a. It increases student interest in the subject through direct participation in the class.*—The

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instructor serves as a leader of the discussion and, as such, he should encourage questions from the students. It may be noted here, however, that even though a student does not ask a question or volunteer a suggestion, he may be participating in the sense of listening attentively to the discussion.

b. It stimulates student thinking.—Learning is made a mental activity in which the student takes part. Whenever such activity is accompanied or followed by doing, the learning is rapid and lasting. The learner who talks or thinks through ideas in discussion is making use of what he knows. Consequently, he will be well equipped to apply this same knowledge later in practical situations.

c. It gears the rate of presenting materials to the student's absorption of new ideas.—Often the discussion session is the instructor's best check of the general level of attainment of his class. If, for example, he finds that his questions are consistently too difficult, as revealed by the responses of a large number of students, he knows that he must go over certain materials again, that he has misgaged the degree to which his instruction has been getting across.

d. It provides opportunity for expression of student attitudes.—The contributions and remarks made during a discussion often indicate the interests of the students, and their attitudes toward the training program. These are important, since instruction accomplishes little unless the students are eager to learn and feel that the subject matter is worth while. All too often instructors believe that they have discharged their duties when they have presented the facts, principles, and skills listed on their lesson plans. They forget that it is their duty to study and, if necessary, modify the attitudes which soldiers bring to and carry away from their class.

e. It reveals specific student strengths and weaknesses.—After a subject has been presented to a class, the instructor needs to know not merely how well the students have mastered it in general, but exactly how well each phase is understood. Are there some points which no one in the class understands? Are there some which everyone knows? Are there students who have failed to master some parts? These points will be clarified by the students' responses in the discussion. With this knowledge the instructor can plan his next teaching steps to remedy any weaknesses which exist.

f. It introduces new material from the pool of class experiences.—Often students will have from their reading or experiences a number of new ideas which are related to the lesson. The instructor will do well to encourage contributions of this sort from class members as they

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are desirable means of stimulating student interest, of relating the subject to the students' backgrounds, and of bringing new applications to the lesson.

41. Cautions in use of discussion.—*a. Limitations of the procedure.*—Certain characteristics of discussions call for special consideration and preparation to give this teaching procedure its maximum value.

(1) It may become disorganized. It requires a high degree of skill on the part of the instructor to keep the discussion progressing with reference to a specific objective. He must be able to handle situations that tend to shift the discussion from the central theme. Some students will ask questions in order to draw attention away from the subject or to prevent the instructor from asking questions. Some will ask questions which are too difficult for the class to answer at its present stage of development. It will be necessary for the instructor to decide when questions are too difficult and should be postponed to a future place in the course, or when questions are too easy and cover material that has been explained adequately.

(2) It may confuse the student. The instructor should always summarize the important facts and conclusions so that every student will have a clear picture of what has been discussed and will feel that definite progress has been made.

(3) It is not a method which can ordinarily be employed in large classes. In those of more than 25 students the technique is difficult to handle unless the instructor has marked ability. Large classes can be divided into smaller groups led by the instructor's assistants.

b. Questions to be considered before using the discussion technique.—Before conducting a discussion, the instructor should ask himself the following questions:

(1) Can this material be taught most effectively by means of a directed discussion?

(2) Have the students been prepared to acquire information in this way?

(3) Am I capable of using this technique to teach the students?

If the answer to any of these questions is "No," the outcome will be little or no learning. If all of them can be answered in the affirmative, the discussion should be worthwhile.

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SECTION V

EXPLANATION—ILLUSTRATION

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General considerations in using illustrations	43
Specific types of illustrative materials	44

42. Illustration as a teaching procedure.—Illustrating lectures and discussions through the use of blackboards, diagrams, maps, charts, pictures, films, objects, models, and sand tables is one of the most effective ways of presenting new materials to a class. Often things seen have more appeal than things heard; consequently, they enlist more interest and are remembered longer. This means that practically every lecture or discussion needs visual illustrations.

43. General considerations in using illustrations.—*a. Preparation.*—As discussed in paragraph 29, visual aids should be selected and procured well in advance of the lesson. Before beginning the class, the instructor should make certain that all training aids are ready for use, since there is no more potent destroyer of class morale than seeing an instructor fumbling with a chart not properly hung, struggling with equipment not ready for demonstration purposes, or discovering at the last moment that the projector for showing a training film is not properly set up in the classroom.

b. Appropriate explanation.—Merely displaying a visual illustration is not enough. Even though a chart on first aid has been prepared to present a fact convincingly, some explanation is necessary. Illustrations should be discussed and explained so that students not only see but hear about the subject matter.

c. Interrelations among illustrative materials.—Several types of illustrations are often used in one lesson, but the relationship of one to the other needs to be shown. For example, in teaching the care of the rifle, the instructor will find it expedient to have an actual rifle before the class as well as diagrams revealing the mechanism. He may also show a training film. The diagram and film will be many times more meaningful if the corresponding parts on the actual rifle are pointed out. Or, in a lesson on antitank defense, small phases of the movements can be shown on a sand table while the total tactical situation can be illustrated on a map. Using several illustrative devices at one time, however, may confuse students unless the relation of each to the others is clearly defined.

d. Proper timing.—In every course or lesson there are many times at which illustrative materials can be introduced. This raises the question, "When will each illustration be most pertinent?" The

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guiding principle in finding an answer to this question is simple: *Use each illustration at the place in the lesson where the students will gain most from seeing it.* Sometimes showing an actual object is the best means of arousing interest, and when this holds true, the object should be displayed during the introduction. At other times it may be more meaningful to give a brief explanation first. Frequently, the same illustration will be brought to attention more than once in a class period.

e. Number of illustrations.—Excessive numbers of illustrations confuse the students' minds just as they clutter the classroom. Men can observe and study only a few things at a time. A few well-chosen examples drive home the facts forcibly and permanently; too many illustrations obscure the major teaching points.

44. Specific types of illustrative materials.—

a. Blackboards (see pars. 23 and 24; fig. 29; and par. 81, FM 21–5).—(1) Blackboards can be used to advantage both indoors and out. They are especially suited to—

(*a*) Presenting in sequence the steps in a procedure.

(*b*) Listing the steps in a procedure or operation.

(*c*) Presenting new terms.

(*d*) Indicating information, such as Army organization, for which printed material is not yet available.

(*e*) Keeping important rules and statements before the class while the instructor is talking about them.

(*f*) Listing such things as requirements and assignments.

(2) The disadvantages of blackboard illustrations are:

(*a*) Lack of permanence.

(*b*) Ineffectiveness for large groups.

(3) The instructor must avoid—

(*a*) Obstructing his own writing.

(*b*) Talking to the blackboard.

(*c*) Writing illegibly.

(*d*) Sketching carelessly.

b. Maps, charts, plans, and pictures (see pars. 151 to 163, incl.; figs. 30 and 71; pars. 82 and 83, FM 21–5).—

(1) These illustrations are useful because they are—

(*a*) Good substitutes for actual objects or models not available for class use.

(*b*) Means of clarifying details of construction or operations not readily seen in the actual object.

(*c*) Permanent and can be used many times.

(*d*) Easily moved from one place to another.

(*e*) Flat and can be stored in little space.

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(2) Some difficulties associated with them are that they may—

(*a*) Require additional personnel and time for presentation.

(*b*) Be used to illustrate only a few points at a time.

(3) To secure maximum teaching effectiveness they should be (see par. 156)—

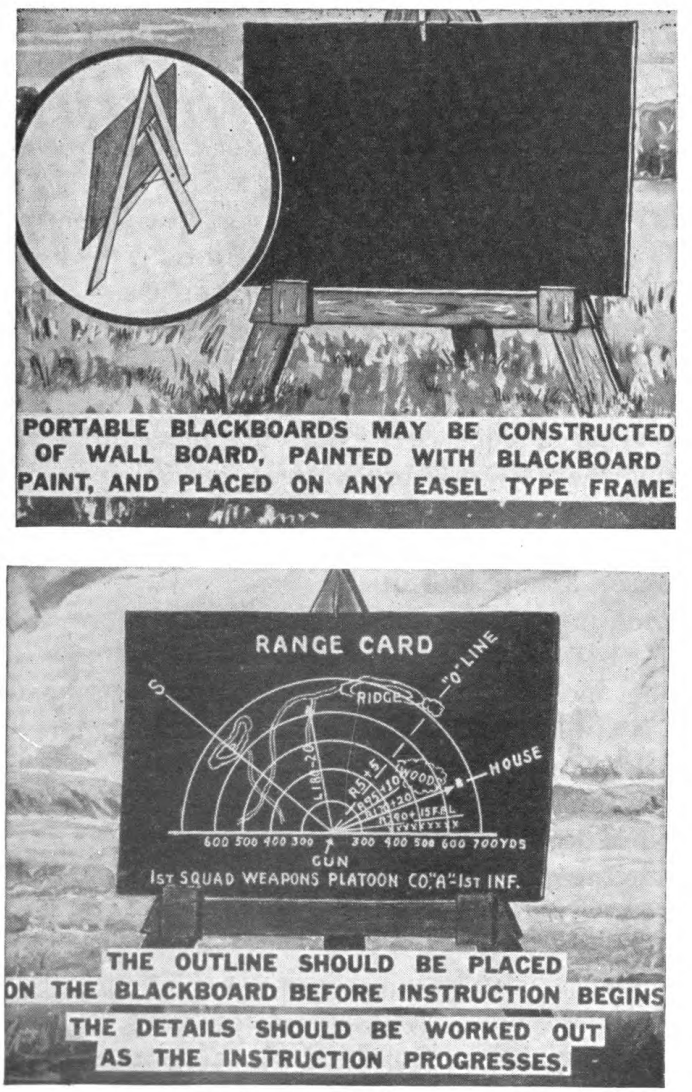


FIGURE 29.—Blackboards.

(*a*) Large enough to be seen by every student if displayed before the entire class.

(*b*) Accurate in every detail.

(*c*) Simple and clear enough to make the major points readily apparent.

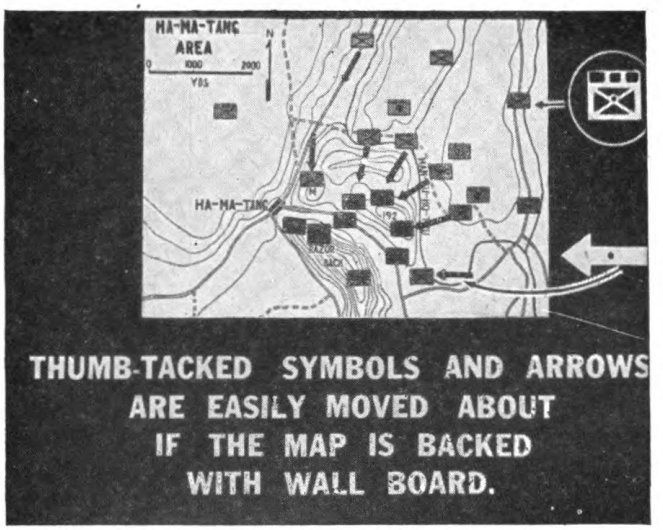
(*d*) Neat in execution.

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c. Actual objects (see pars. 145, 146, and 147; figs. 31 and 36; par. 87, FM 21–5).—(1) Actual objects are useful because—

(*a*) They stimulate interest by bringing the students closer to actual experiences.

(*b*) They enable the student to establish familiarity with equipment, and thereby develop understanding of and confidence in his weapons and tools.



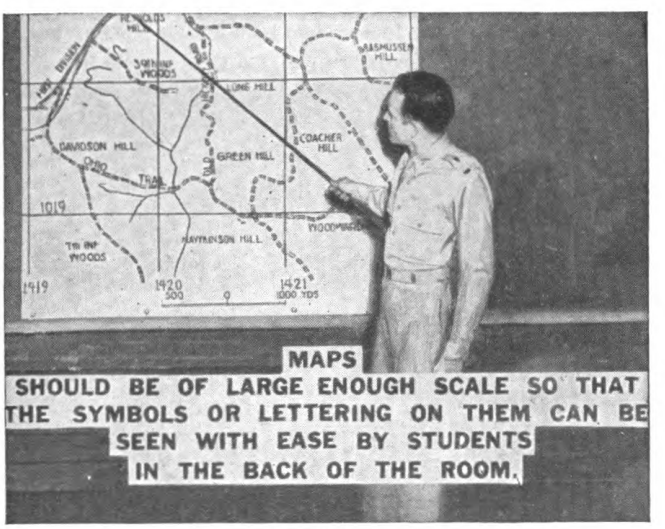


FIGURE 30.—Using maps.

(2) At times there are certain disadvantages in using actual objects:

(*a*) They are difficult to procure in sufficient quantities for each man to have some experience with the equipment.

(*b*) They are difficult for the students to see, if only one object is available.

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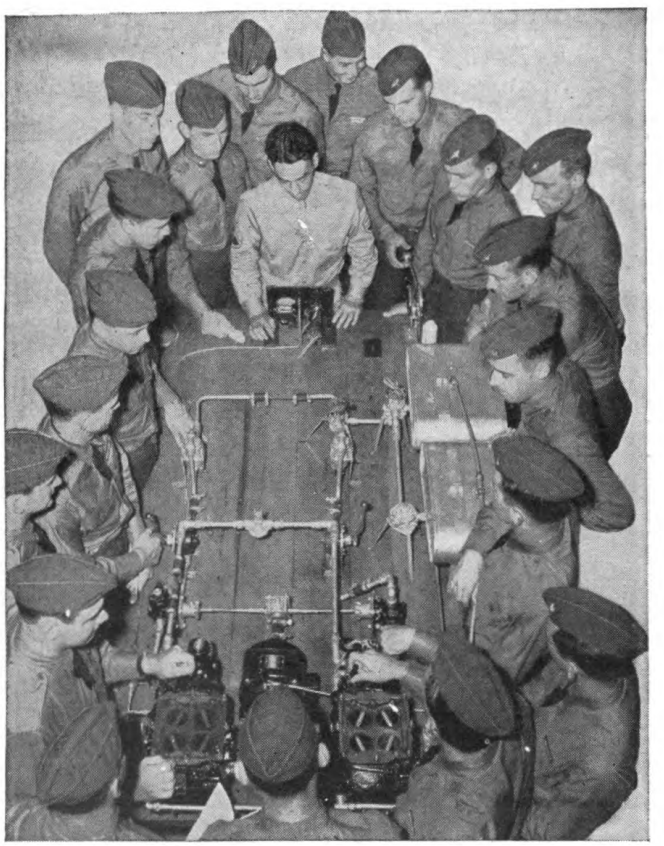


FIGURE 31.—Airplane fuel system mounted on display board.

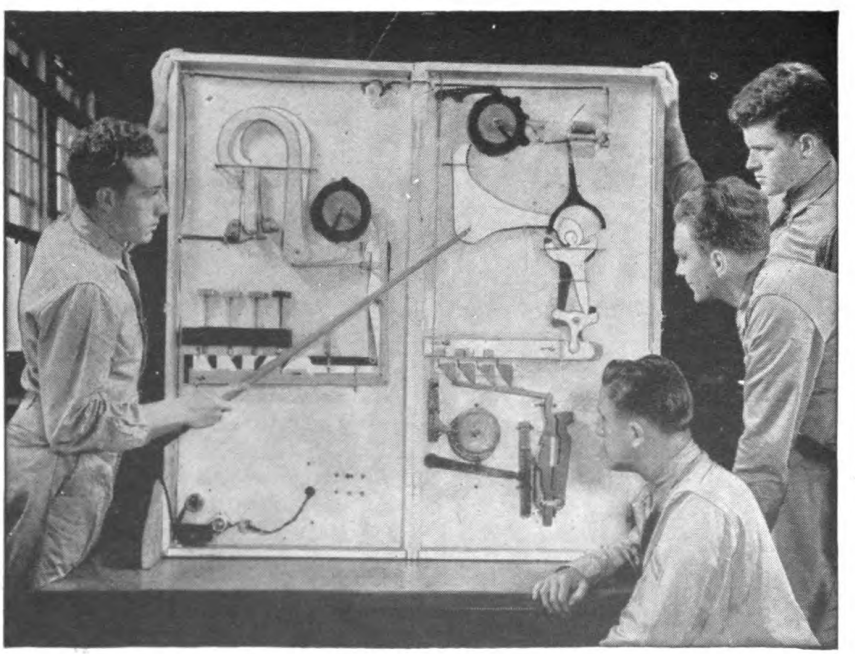


FIGURE 32.—Enlarged working model of teletypewriter unit.

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(*c*) They are awkward to handle in the teaching situation.

(3) To secure maximum teaching effectiveness, the instructor should—

(*a*) Make an effort to provide each man, or small group, with an opportunity to work with the equipment.

(*b*) Make certain that all students can see the object if he can secure only one.

(*c*) Be thoroughly familiar with the equipment and skillful in performing each operation he is illustrating.

(*d*) Proceed slowly enough with his explanation that every man grasps every step of the procedure.

d. Models and sand tables (see pars. 148, 149, and 150; figs. 21 and 32; and par. 87, FM 21–5).—(1) There are many advantages in using models and sand tables.

(*a*) Both may be used when it is not possible or feasible to secure actual objects or when these serve better the purposes of the lesson.

(*b*) Enlarged or sectionalized models of small objects are frequently more effective than the objects themselves for display or demonstration before a class.

(*c*) Small scale models of ground forms illustrate terrain features and the like more clearly than the actual landscape.

(*d*) Sand tables are adapted to the representation of field problems of many kinds, being excellent devices for giving an over-all picture of a situation of large scope.

(2) The difficulties of using models and sand tables are largely those of efficient handling in the teaching situation and in storage:

(*a*) Equipment, personnel, and time for preparing them is not always available.

(*b*) Only a limited number of students can see them.

(*c*) Space for storage is sometimes difficult to find.

(*d*) Moving models and sand tables is difficult.

(3) As with other illustrations, the effective use of models and sand tables demands that they be—

(*a*) As accurate as possible.

(*b*) Displayed so that all the students can see them.

(*c*) Explained as they are used.

e. Films (see par. 164; figs. 33 and 75; pars. 2 to 8, incl., FM 21–7; and pars. 78 and 79, FM 21–5).—(1) Some of the advantages in the use of training films are that they—

(*a*) Arouse and hold student interest.

(*b*) Can illustrate an almost unlimited scope of material.

(*c*) Can use a variety of techniques to explain the subject, such as long-range shots for large operations, close-ups for details, slow-

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motion for rapid processes, animation and sketches for complicated operations.

(*d*) Can be shown to large groups.

(*e*) Can be used many times.

(*f*) Are easily stored in small space.

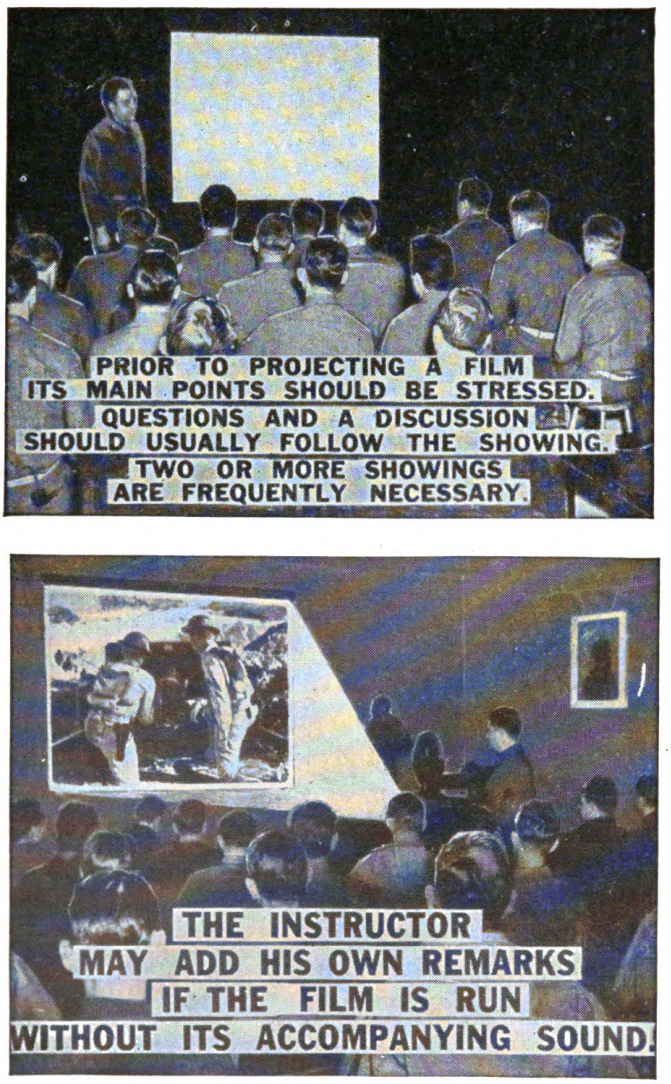


FIGURE 33.—Using a film.

(2) The disadvantages of films relate to their projection and proper handling.

(*a*) Special equipment is needed for their use in teaching.

(*b*) Suitable space is not always available.

(*c*) Films are fragile and must be handled and stored with care.

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(*d*) The films must be projected in a sufficiently dark place. When a suitable room is not available, a shadow box (see figs. 76 and 77) used either indoors or outdoors in the shade of a building will give good results.

(3) The instructor should be thoroughly familiar with the materials in the film before showing it to his class. He should make certain that each film is:

(*a*) Accurate and up to date. If they are not, he must make appropriate explanations.

(*b*) Scheduled in relation to the course plan.

(*c*) Explained briefly before being shown.

(*d*) Discussed after showing to make certain that the students understand the salient points.

(*e*) Followed by an examination to check student mastery.

f. Slides and film strips (see par. 164; figs. 22 and 76; pars. 78, 79, and 80, FM 21–5; FM 21–7).—(1) Slides and film strips have many of the advantages of training films, but in addition they have these possibilities:

(*a*) The picture can be held on the screen as long as necessary for the instructor to explain and the students to study the material.

(*b*) The equipment needed for their projection is simple.

(*c*) Slides and film strips can be readily prepared for illustrating special phases of a subject.

(2) The disadvantages and the teaching procedures for the instructor to observe are similar to those listed above for training films. A precaution in using these teaching aids is that the lecture or discussion notes must match the film sequence. The instructor must take care to plan and time his comments in relation to the order of the slides or film strip. A rehearsal is essential to make certain that there is perfect coordination of visual materials and lesson notes.

SECTION VI

DEMONSTRATION

	Paragraph
Demonstration as a teaching procedure	45
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45. Demonstration as a teaching procedure (see par. 74, FM 21–5).—*a. Demonstrations are accurate portrayals of procedures or operations.*—Their purpose is to show how things are done, and to show them in such a way that the students will learn the procedures

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and operations. Demonstrations should be used whenever possible in the teaching of basic manipulative operations involved in technical work; the operation and functioning of equipment, tools, and weapons; the operation of tactical units under combat conditions; and in connection with the application of principles and skills to specific situations and problems. Thus, demonstrations may be used to supplement lectures, to prepare students for the correct application of knowledge and skills in tactical or practical exercises, to clarify materials previously studied by the students, to teach proper standards of workmanship, and to bring students closer to actual work and battle conditions.

b. Demonstrations used in conjunction with other teaching procedures.—Demonstrations are never sharply distinguished from other teaching procedures. They are always preceded by an explanation, frequently lead to a directed discussion, and are followed by applications and examinations. Demonstrations make use of the same training expedients and serve many of the same purposes as illustrations. Accordingly, the principles stated in paragraph 43 apply equally well to demonstrations. In fact, the teaching procedures used in presenting new materials should be thought of not as separate methods, but as closely related ways of attaining the lesson objective.

c. Factors to consider in demonstrations.—(1) Demonstrations should give students the "feel" of the entire operation as it is ordinarily performed. If, as is often necessary for the sake of simplicity, the demonstration must be divided into a number of separate operations, the way in which each part fits into the whole sequence should be clarified. Although some phases of the operation demonstrated will have to be done slowly and perhaps repeated, it is important that, at several points, the demonstration be presented exactly as the student is to learn it. This should be done at the beginning and as often as necessary during the lesson so that the students see clearly the goal for which they are working.

(2) The scope of the procedures demonstrated should be limited so that every student will be able to grasp and understand the processes. When possible it is best to limit each demonstration to one or a few related procedures. In a complex series of operations as a tactical exercise, the students should be familiar with the separate activities beforehand.

(3) Short demonstrations are more effective than long ones. Only one operation should be demonstrated at one time, and the next should not be started until the students understand the preceding one. Long or complex operations can be divided into smaller parts for demon-

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stration, and the ways in which such operations are combined in actual practice indicated.

(4) Demonstrations should be given as the need arises. Little good comes of demonstrating a process which will not be used in the immediate future. The greater the time lapse between the demonstration and its application, the less likely students will be able to apply their learnings.

(5) The skill of the instructor should be an ideal to follow. In no other phase of teaching is the instructor's skill so apparent to his students as in a demonstration. Few students are consciously aware of the techniques employed by an expert lecturer or discussion leader, but every student will be quick to see whether or not the instructor is really master of the apparatus he is demonstrating. If a high quality of workmanship is expected from a class, the instructor should set an example.

46. Technique of conducting a demonstration.—*a. Preparation.*—The instructor should complete the following steps before he is ready to conduct a demonstration for his class:

(1) Determine the specific purpose of the demonstration.

(2) Study the operations to be demonstrated.

(3) Prepare complete plans for presenting the demonstration, listing performance steps in their proper order.

(4) Anticipate those steps which may cause greatest difficulty and have ready some form of supplementary instruction to clarify the points.

(5) Set up all equipment and materials.

(6) *Remove all possible visual or auditory distractors before beginning the demonstration.*

(7) Arrange for sufficient illumination on the equipment.

(8) If demonstration troops or other personnel are required, determine exactly the manner in which they will be used and the equipment necessary.

(9) Make arrangements so that all students will be able to see the demonstrations. If possible, they should see it from the angle at which they will do it.

(10) Finally, *rehearse the demonstration in order to be sure that everyone who is to participate can do the process skillfully.* Furthermore, the rehearsal will show if the demonstration can be completed in the allotted time.

b. Conducting the demonstration.—(1) Make every demonstration an integral part of the lesson. The demonstration must contribute its share toward achieving the lesson objective, and must be performed in exactly the right manner at the right time.

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(2) State the purpose and explain the process *briefly*. Interest will be killed by an over-long, preliminary explanation.

(3) Go through the process at normal speed, changing position from time to time to suit the convenience of the class.

(4) Repeat the process slowly if necessary.

(5) *Explain and demonstrate at the same time.* Although explanations should precede or follow a demonstration, brief remarks should be used to explain each step.

(6) Emphasize safety precautions to the extent necessary for the operation demonstrated. In many cases this is one of the most effective byproducts of teaching through demonstrations.

(7) Whenever possible, use visual aids to supplement the demonstration. For example, charts frequently may be used to advantage in teaching the details of a machine's operation at the same time the machine is being demonstrated. Film strips, pictures, models with cutaway parts, and other teaching aids may be used similarly.

(8) Question the students as the demonstration proceeds in order to check on whether or not the teaching is clear, to guide learning, and to insure attention. Encourage students to ask questions during the demonstration.

(9) Check at the end of each demonstration to determine its effectiveness.

(10) Summarize the essential points.

c. Example of a technical demonstration.—The following example of how a demonstration was used in teaching wire splicing will be helpful in showing the application of the procedures suggested above:

(1) The instructor aroused interest by citing an example of the importance of wire splicing in combat. He then briefly explained the principal steps in the operation.

(2) Standing in view of the entire class, the instructor selected his materials and rapidly spliced two loose ends of wire together. He explained the necessity for this procedure in wire splicing, and demonstrated the value of his method by handing the wires to two students who tested the strength of the splice by pulling in opposite directions.

(3) Again standing in view of the entire class, the instructor made the splice very slowly, explaining his movements step by step.

(4) The instructor then made the splice in slow motion without breaking the process into steps.

(5) The instructor then supplied each student with the necessary wire and equipment, and directed them to make the splice step by step, pausing after each step to allow the instructor to examine their work.

(6) Each student then completed a splice and presented it to the instructor for inspection.

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(7) Those students who excelled in the skill were permitted to assist those who had difficulties.

(8) The students were paired and a contest was conducted in which the speed and efficiency of the men were tested.

d. Example of team performance—combat training.—(1) The S–3 in charge of a battalion has planned a demonstration of the technique used by a unit advancing. His demonstration was used for instruction in the basic principles of combat fighting and in the technique of combat unit performance.

(2) He has scheduled a nearby hillside as an amphitheater and several acres of moderately open terrain as the combat area, and he has

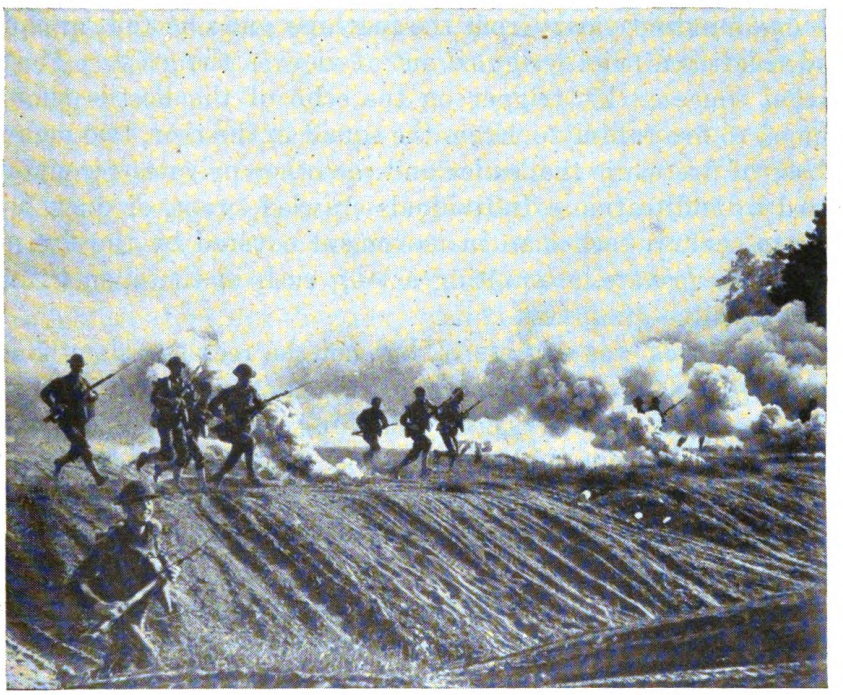


FIGURE 34.—Troops demonstrating advance through smoke screen.

spent 2 hours in rehearsing a demonstration unit from the battalion training cadre. He has provided weapons, blank ammunition, and a public-address system.

(3) With the battalion assembled, the battalion commander, acting as director, started with a short talk stressing, in simple language, the importance of cover, extended order formations, and weapon employment in modern warfare. He told his men that the first demonstration would take place in the area just before them—that a squad, preceded by scouts, would cross the area coming unexpectedly against the hostile reception committee of one machine gun and crew backed by three riflemen.

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(4) Upon signal, the demonstration squad came over a low ridge. The director told the men to watch the way the squad stayed under cover, how the leader observed the course of advance while the scouts reconnoitered the potentially dangerous area ahead. The scouts leap-frogged forward, taking every possible advantage of existing cover, while the director drove home to his audience that the stationary scout is always in position to fire in protection of his comrade, should the enemy come suddenly into sight.

(5) The director likewise emphasized the effect this type of advancing has upon waiting opponents. When threatened by stealthy approach, they will usually open fire too soon, often with little accuracy, and reveal their position. The enemy fired when the nearer scout was about one hundred yards from the machine gun; he fell, grasping a wounded left arm, and wriggled out of view in the grass. The partner scout squeezed his trigger on the echo of the hostile shots and continued to fire rapidly. From the squad in the rear, two men acted as a base of fire while the leader and the other privates reconnoitered forward by infiltration. Individuals crawled, crept, or ducked from shelter to shelter, each man in movement covered by the fire of the others. One private, attempting a long rush in the open, crumbled under a machine-gun burst.

(6) The attack was aggressive, but not the reckless, slam-bang advance usually observed in maneuvers; the continuous rifle fire gradually cut down the defenders, and a flanking skirmisher finally worked in on the machine gun and put it out of action with hand grenades. When the mopping up of the gun position was over, the remainder of the squad re-formed and continued the advance a short distance before the situation ended.

(7) The director, who had been making a running commentary over the loud speaker during the problem, then added a short critique in which he emphasized the purpose of the various men in the squad, the coordination and teamwork displayed, and the way the infantry weapons were combined in the attack. He then announced that the same exercise would be developed improperly. All personnel were to watch for errors and to be able to tell what was wrong, and why it was wrong, in each step of the next demonstration.

(8) Upon a second signal, the demonstration squad again came over the ridge. The men were grouped in a close squad column with the scouts marching 50 yards ahead, eyes straight to the front and rifles slung. The loud speaker broadcast the low tone order of the enemy squad leader to his men. At his command, the riflemen knocked off the two dummy scouts while the machine gun ripped the tagging

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squad column apart. Upon a prearranged signal, the hostile fire spit out in blank-cartridge bursts. Both scouts crumpled into the grass; half of the men behind them went down like pins in a bowling alley. One temporarily unhurt survivor dropped his rifle and ran to the rear. Shots followed him and he soon dropped in a heap. Another man dropped to one knee, aimed at the machine gun, discovered that his piece was not loaded, and was killed before he could insert a clip. A third man, simulating a broken leg, dragged himself behind a rock. A fourth, gaining the shelter of a tree, was cut down while firing from the wrong side.

(9) This scenario was acted simply, and the men followed it with interest. The director then held a critique in which the students assisted by pointing out the errors. The director reemphasized the correct methods by calling attention to the way it was done in the first demonstration.

e. Time for demonstrations.—The demonstrations cited in the above examples could be used in the training program before the men had had any instruction in these procedures and operations. Such demonstrations not only arouse interest but teach men the basic techniques. It is not necessary, however, always to use demonstrations as introductory steps, for they may well be used either as intermediate or summary steps.

f. After the demonstration.—Considering the following questions after each demonstration has been carried out is one means of improving future demonstrations:

(1) Were the students ready for the demonstration?

(2) Were all the necessary tools, equipment, and personnel available and properly placed?

(3) Were all students able to see and hear?

(4) Were the principal steps presented in the order indicated on the lesson plan?

(5) Did the instructor ask and the students raise pertinent questions?

(6) Was the most effective use made of supplementary visual aids?

(7) Was information presented which might well have been omitted, or was some information omitted which should have been included?

(8) Was student interest maintained throughout the demonstration?

47. Advantages of demonstrations.—A well-planned and well-executed demonstration is one of the most effective ways of teaching because it—

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a. Provides contact with actual objects and procedures. The students get the "feel" of the situation.

b. Shows the steps in an operation in a realistic manner.

c. Arouses and maintains interest. Men have a natural curiosity about how things "work." They like to see action. Thus, the instructor conducting a demonstration is appealing to fundamental sources of interest.

d. Appeals to all the senses. The students not only see and hear in a demonstration but also tend to imitate the movements of the instructor. This develops a muscle set which will aid them in carrying out the procedures during the application phase.

e. Has dramatic appeal. A well-staged demonstration, especially of field operations, can have a dramatic quality which not only sustains interest but intensifies learning.

48. Cautions in use of demonstrations.—The following factors deserve careful consideration:

a. Demonstrations require careful preparation and rehearsal.

b. Demonstrations require extensive equipment and often additional personnel.

c. Only a few types of demonstrations can be used successfully with large groups.

d. Time is frequently lost in taking the group to and from a demonstration.

e. Group demonstrations are based on the assumption that all the learners need to know the same things at that time and that they realize this need. Because these conditions do not always exist, group demonstrations must frequently be supplemented by individual instruction.

Section VII

EXPEDITING LEARNING

	Paragraph
General	49
Handling men	50
Making use of learning motives and incentives	51
Overcoming interest-destroying factors	52
Applying learning principles	53

49. General.—In conducting a class, there are techniques and devices which the instructor should use to expedite learning. Many of the following suggestions are simply the application of acceptable human relationships applied to teaching situations; others are common-sense rules for personal success; still others are principles of learning derived from effective educational practice.

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50. Handling men.—*a.* Every instructor works with soldiers, not machines. As a leader of men, he must know them well, be able to secure their cooperation, and train them so that they will be good soldiers through voluntary compliance and their own initiative rather than through conformity forced by superiors. Providing an example of an Army leader who is fair, firm, and friendly is the best way to attain this objective. The teaching situation is one place of setting such an example.

b. The instructor should be *fair* in all dealings with his men. He should—

(1) Show no partiality or favoritism.

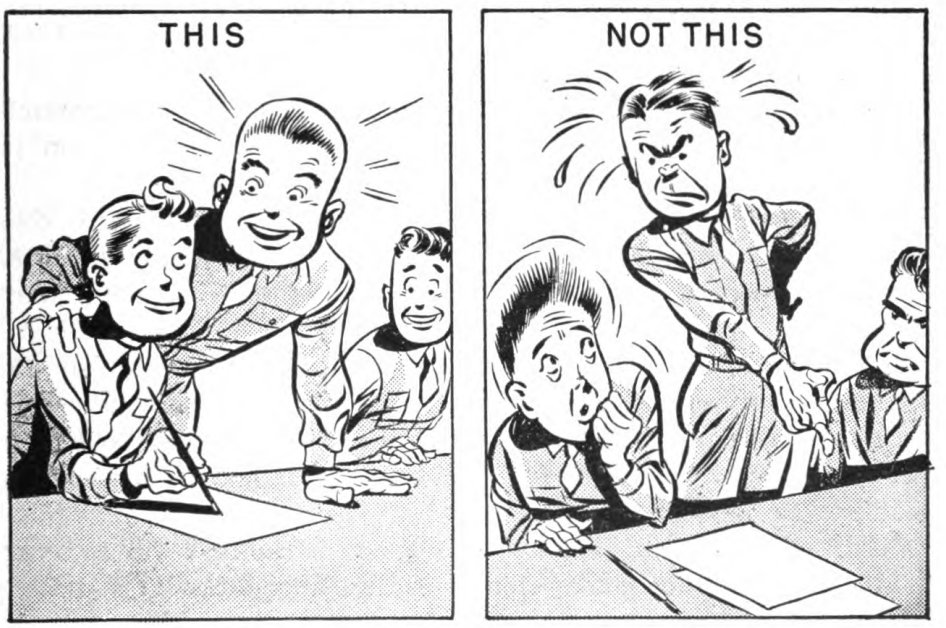


FIGURE 35.—An instructor should be friendly and courteous.

(2) Never call down the entire class for the mistakes of a few.

(3) Never try to bluff. The students are intelligent and soon learn when they are being fooled.

(4) Be willing to acknowledge a mistake. The statement, "You were right, and I was wrong" can do much to develop morale.

(5) Never be hasty in judgments. A student should not be penalized unduly because of one mistake he has made.

(6) Be loyal to his class. He will try to remedy at once any errors of administration affecting his men.

(7) Be loyal to his superiors and to Army policies. As an Army leader, he will carry out the intent of his orders.

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(8) Never make a duty a punishment. That tends to weaken the military ideal of duty as a privilege or a service. No matter how menial, a duty should be carried out willingly. Privileges should not be confused with punishments.

c. The instructor must be *firm.* He should—

(1) Act decisively. In making a decision he should take into consideration all factors and act with conviction.

(2) Abide by decisions. A fair decision, once made, should be carried through; an order, once given, should be executed. Students respect a man who makes decisions and puts them into action.

(3) Keep the class directed toward its objective. The instructor will see that the activities of each lesson are directed toward achieving the objective.

d. The instructor should be *friendly.* He will—

(1) Be interested in his men, know them, their backgrounds, their problems, and their achievements. One mark of a good instructor is knowing and using the names of the men.

(2) Respect the rights of his men. Just as a company commander's first duties in the field are to care for the safety and comfort of his men, so an instructor must always place the class above his personal considerations.

(3) Be courteous. It is rare that an officer is not tactful or considerate of his superiors, and it is just as important that he use the same approach in dealing with his subordinates. He should correct mistakes in a straight-forward impersonal manner; never sarcastically or personally.

(4) Be enthusiastic. Interest in a lesson is the best way to secure good class discipline and rapid learning, and interest is directly related to the enthusiasm the instructor has for his subject.

(5) Be cheerful. An instructor is handling men who will reflect his attitudes.

(6) Know how to use humor in the classroom. A story or example can put over a point effectively; it can also create a feeling of good will.

(7) Encourage class participation. The good instructor knows that when all students want to take part in a class discussion, real interest has been created.

(8) Be able to secure the cooperation of his students. By exhibiting his own ability in all situations, by showing his willingness to help the students, by respecting the ideas and suggestions of the men, an instructor can weld his group into a cooperative, closely knit unit. He will lead his men instead of driving them.

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(9) Encourage initiative and self-reliance. Modern warfare places a man on his own much of the time. The soldier who has learned to think for himself will be able to handle problems for which he has been taught no prescribed procedures. The capable instructor will welcome the assistance of students having exceptional backgrounds, and use their knowledge in teaching the class.

51. Making use of learning motives and incentives.—There are many personal and social motives and incentives which the alert instructor can use in promoting and maintaining student interest and in aiding learning. Motives are the wants, desires, urges, or other internal "drives" which spur a man to action; incentives are such things as rewards, increases in pay or rank, social approval, praise and prestige.

a. Value of satisfaction and self-confidence.—Most men get a kick out of doing a job well and having confidence in their ability. Accomplishing a task stimulates the learner to further achievement, and the instructor can build on this natural interest and enthusiasm to great advantage. Simplicity of presentation and proper arrangement of materials will aid student mastery which is essential to student satisfaction. (See par. 18.)

b. Desire for personal gain.—To strengthen the soldier's natural desire to make the best of his Army training, the instructor should point out the possibility of advanced ratings and increased pay for men who display aptitude. Military specialists are always needed, and appropriate rewards await the men who deserve them.

c. Desire for personal security.—Self-preservation is a perfectly normal impulse, and much Army training has that ultimate objective. If the various aspects of instruction are made clear to the men in this light, they see the reason for the knowledges and skills they are expected to acquire. In some phases of teaching, as in bayonet drill or defense against mechanized attack, this is obvious. In other instances, as in keeping accurate records of equipment, repairing and maintaining trucks, and preparing examinations for courses, the immediate relationship to personal security is obscure and demands clarification. The "What's in it for me?" attitude is natural and understandable, and the query must be answered.

d. Desire for group security.—A soldier thinks of his unit as well as of himself. In actual combat, he is interested in keeping the unit, of which he is a part, intact. The appeal of "belongingness" and teamplay prompts his actions. The stories of heroic self-sacrifice that fill military history are examples of men placing the security of their group above that of themselves. In times of crisis it is an urge stronger than self-preservation. Before sacrificing himself, however,

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a soldier must feel that what he fights for is greater than he is. He should develop pride in his unit, in his Army, and in what it stands for. An instructor can do much to foster this feeling, and once a soldier has it, his incentive to learning is strengthened.

e. Desire for group approval.—Every man wants the approval and praise of his friends and superiors. The instructor can build upon this natural desire and stimulate interest in good performance by giving praise where it is due.

(1) The use of competition is often effective in improving performance. Competition, when it results in the approval of only one or a few men in a large group, often defeats its own purpose. It discourages men of low ability in a particular skill from trying and may cause their performance to deteriorate rather than improve, under competitive conditions. However, a situation in which each man competes with his own performance, and group competition in which a man knows that by improving he will help his unit are both strong learning incentives.

(2) The desire for group approval can be used to develop initiative and resourcefulness on the part of the soldiers. Many men discover ingenious devices for solving field problems. A sergeant, for example, on running out of field wire, found that he could maintain his communication lines by connecting to a barbed wire fence. In other instances, the resourceful soldier can develop equally ingenious devices. Such ingenuity should be encouraged and the men given credit for their accomplishments.

f. The challenge of new experiences.—Of and by themselves new experiences are usually stimulating. Curiosity, a common characteristic of almost everyone, explains this in part.

(1) Every lesson should introduce something new, and this new material should be so dramatized by the instructor that it is shown as something desirable and interesting.

(2) Variation in teaching procedure and the use of new devices, by offering the students new experiences, help to maintain interest. A series of lectures can be enlivened by demonstrations and motion pictures. A class may be opened with a question-and-answer period instead of having it at the end. This not only varies the procedure but stimulates the men for what is to follow.

52. Overcoming interest-destroying factors.—Certain student attitudes and feelings may forestall or prevent the development of interest. These the instructor must change if he is to teach effectively.

a. Lack of adjustment to Army training.—(1) *Self-consciousness.*—Many recruits are lost in a maze of new surroundings that make demands upon them for adjustment to a system that appears tremen-

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dously complicated. They may become hesitant and self-conscious. Feeling overpowered, such men are afraid to react in a positive way. This hesitance and lack of self-confidence can often be overcome by making such men feel "at home" in the class, by making clear what is expected of them, by making them a part of their new situation.

(2) *Antagonism to military procedures.*—The average civilian often experiences a feeling of antagonism toward the rules, customs, and courtesies of the service. He can see no reason for them; they seem pointless and unnecessary. The purposes of the rules and courtesies which are part of the military tradition should be explained by the instructor.

b. Unfair treatment of men.—(1) Giving a student more than his share of company duties is an obstacle to efficient learning, and may seriously lessen his interest and progress in a class. Since almost all Army instructors are also commissioned or noncommissioned officers, they can eliminate this interest-destroying factor by checking carefully to see that no man is given more than his share of company duties, and, consequently, that he is not obliged to be absent from his classes more often than is necessary.

(2) The belief that a man has been improperly classified often arouses his antagonism. Since much of this ill will is due to a lack of understanding of the Army requirements, an explanation of the problem of overages and shortages is needed. Few men object to being classified as truck drivers instead of as riflemen when they realize the need for truck drivers. If an error of classification has been made, an officer should do what he can to correct it.

c. Impatience.—The enthusiastic student with the "give me a gun and let me fight" spirit wants to get into the field immediately; he does not see the need for much of the preliminary training which he receives. The instructor should make clear the purposes of all the phases of instruction which the men receive, and the necessity of knowing the procedures presented. A gunner who does not know how to handle a dud or a misfire can easily lose his hand, if not his life. The man who feels that learning to remove misfires is a waste of time may become impatient at being taught this procedure. But when shown the importance of the training in terms of field use, this same man will become an attentive student.

d. Worry and lack of spirit.—Emotional upsets and worries can keep a man from developing any interest in Army training. He may be homesick, or lonesome, and feel that he has no one in whom to confide. An instructor, by a special conference, should act as an adviser or counselor and can often do a great deal to help a man in these difficulties to "find himself." He can also suggest to other

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students in the group that they make special effort to include such men in their "bull sessions," or on trips to town.

e. Relation of out-of-class factors to learning.—What a student does out of class affects his behavior in class. The two cannot be separated, for a student does not become a different person when he enters a classroom. Rather, he brings with him his interests and his enthusiasms, his fears, and his disappointments. An instructor cannot be responsible for all the out-of-class experiences of students. On the other hand, he cannot ignore them, so greatly do they affect his teaching. In short, the more factors related to his teaching and the students' learning that the instructor considers, the better the instruction will be.

53. Applying learning principles.—Experienced instructors inevitably use rules and principles of learning in their teaching. These are based on their knowledge of men, on their experience in practical teaching situations, and on the educational and psychological research of military and civilian educators. If a device is found to produce results, an instructor should add it to his list of techniques. Many learning principles have been discovered, the most important of which follow:

a. The student and his abilities.—(1) Students are mature men. They are not to be treated as children. If they are kept busy at worthwhile activities suited to their level of achievement, there will be few or no disciplinary problems.

(2) Men vary in their abilities. Some can do one thing well, others another. *Everyone can do something well.* It is the duty of instructors to discover those individual abilities, so that every man can be trained most efficiently in terms of his potential contributions to the Army.

(3) Students vary in the *amount* of material they can learn and the *rate* at which that learning can take place. In every class a wide variation of speed of learning will be found.

(4) Students who learn quickly should, when possible, be given additional projects. Care must be taken to see that these additional tasks are not interpreted as a penalty for rapid learning. Quick accomplishment should be rewarded by praise, special privilege, delegated responsibility, or advancement.

(5) Students who learn slowly should be given special attention and training. They should not be penalized for their slowness except when it is due to personal negligence, inattention, lack of preparation, or similar factors.

b. Nature of learning.—(1) Students can assimilate only a limited amount of new material in a given time. Too many facts and

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principles should not be crowded into one lesson. They produce confusion rather than learning.

(2) The previous experiences of a student influence his ability to master new materials. The instructor must consider this point when he uses technical terms or presents new procedures. He may well ask, "Will the students know what this means?"

(3) Students can master a new procedure best if they have already learned the preceding step. Each step should be completely understood before a new one is presented, otherwise confusion and inefficiency will result.

(4) *Learning by doing* is perhaps the most fundamental of all learning principles. Men learn to swim by swimming, to teach by teaching. Instructions preceding and during learning are necessary, but a person does not learn so fast through hearing how to do a thing as by doing it himself, neither is interest so intense nor sustained.

(5) Students learn best those ideas or operations which are accompanied by the most emphasis. Thus the first and last points presented tend to be retained longest because they are emphasized by their position.

(6) Lessons which appeal to the greatest number of senses tend to be the most effective. This is one reason why illustrated lectures and demonstrations should be used as much as possible in military training.

(7) Ideas and procedures that are repeated several times are learned faster and remembered longer than points presented only once or twice. The fundamental points of the lesson should be repeated or restated during the presentation.

(8) A knowledge of success or failure aids mastery. For example, if men learning code can see evidence of progress, their interest is maintained. If they are informed of their errors, they can make the changes necessary to correct their mistakes.

(9) Men learn best when they are *ready* for the material being presented. A student, feeling the *need* for learning a particular skill or principle learns quickly. This factor is of primary importance in arranging materials in teaching order.

c. Incentives and hindrances to learning.—(1) Pride in achievement is perhaps the greatest of all sources of satisfaction. Praise should be given where praise is due; students should be given credit for their accomplishments. These will directly affect class morale and interest.

(2) Worry and emotional upsets reduce a student's ability to learn. The instructor should investigate the causes of maladjustment in any of his students and do what he can to remove or resolve the

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difficulties. Calmness, friendliness, and fairness on the part of an instructor can do much to reduce unwarranted concern of many students.

(3) Clarity of organization aids learning. If a student can grasp the basic outline of a topic, lesson, or procedure, the parts will fall into place in the larger pattern. Bit-by-bit learning without an understanding of how it all fits together is ineffective and wasteful. Few persons retain or can use unrelated bits of knowledge.

(4) Driving men by threats and punishments is not so efficient as leading them by securing their cooperation. Force may work for short periods, but prolonged learning must be the result of a *desire to know.*

(5) Lack of interest on the part of the students is generally the instructor's fault, and he should examine himself and his teaching before blaming the students for their failure to learn. He may lack interest himself, the material may be poorly organized and presented, or the need for the learning may not be apparent to the students.

d. Equipment and procedure.—(1) The use of varied equipment for illustration, demonstration, and application will heighten interest. The instructor must use all available and suitable teaching aids and be ingenious in overcoming a lack of equipment by constructing useful models, charts, and similar materials.

(2) Varying procedures in a class maintain interest. Boredom results when a group is kept at any one type of activity too long. Use of different teaching techniques—demonstration, discussion, illustration, application—will prevent class interest from lagging.

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CHAPTER 4

APPLICATION

		Paragraphs
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II.	Individual performance	57–59
III.	Team performance	60–67

SECTION I

APPLICATION IN ARMY TRAINING

	Paragraph
Example	54
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Types of application	56

54. Example.—Lieutenant Jones, teaching a first-aid class the technique of artificial respiration, proceeded as follows: First, he *introduced* the lesson by pointing out the situations in which the technique should be used and by emphasizing the importance of the proper procedures. Then, he *explained* the fundamental points by a short illustrated lecture and twice *demonstrated* the prone pressure method using different students as his subjects. During the demonstration he called attention to the important points of the technique and afterward conducted a short *discussion.* Following this, the students *applied* the technique. They were paired off, taking turns acting as subject and demonstrator, for a period of 15 minutes. Lieutenant Jones circulated among the men, correcting errors, and commenting upon the desirable features of each student's work. When he found a student making an error, he stopped him, asked a question or two about the proper procedure, and in a few cases took the student to the charts and again explained the important points. After making sure that every student had mastered the fundamentals of the technique, but

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before starting the next lesson, he called the class together for a final brief oral test and a *review* of the basic principles.

55. Application as a stage of instruction.—*a. Definition.*— Application is learning by doing. It is that stage of instruction in

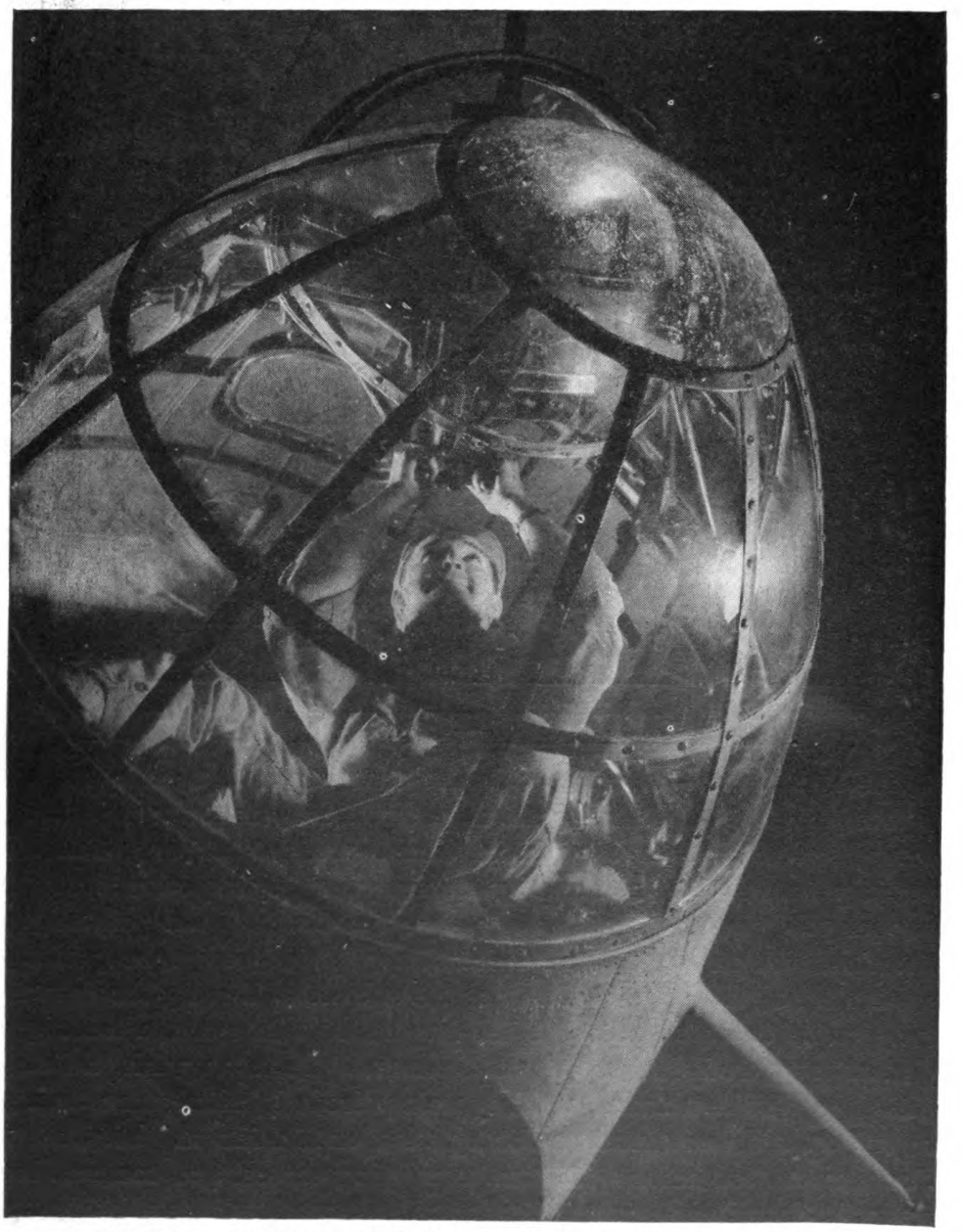


FIGURE 36.—Individual application—practicing machine-gun operation.

which the students, directed and assisted by the instructor, put into practice the procedures and ideas previously taught. The emphasis is on supervised student activity. The example in paragraph 54 shows

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how Lieutenant Jones used application, and it likewise shows how closely application is related to the other stages of instruction. After explaining and demonstrating artificial respiration, he had each man practice it. This practice was followed by an oral quiz and review.

b. Application in the teaching process.—The continuous nature of the teaching process may require the combination of application with other stages of training at various times.

(1) In technical or basic training, the application of a step-by-step procedure may be used with the demonstration of each step; or the examination on a school problem may be combined with an application if the instructor is certain each principle or influencing factor is thoroughly understood.

(2) Applicatory exercises in which a staff or a unit takes part will be both an application of tactical and technical procedures and principles and an examination on the ability of the personnel to use these ideas and methods.

c. Opportunities for application.—All Army instruction affords opportunities for the application of military principles or techniques. For example:

(1) Soldiers can learn to inspect, operate, and use tools, weapons, and equipment. They can make their bunks, take the position of a soldier at attention, and perform close and extended order drill.

(2) Personnel can use sand tables to work out tactical operations, command post exercises, individual and group camouflage techniques, and sanitation lay-outs.

(3) All personnel can be taught movement under enemy observation or fire, scouting techniques, terrain sketching, and the use of the compass.

(4) Men can learn the procedures to be used when a gun stoppage occurs, the effect of wind on sight adjustments, the determination of speedometer multipliers for marches, and the construction of strip maps and circuit diagrams.

(5) Supply clerks can fill out requisitions, reports of surveys, shipping forms, and bills of lading.

(6) Administration clerks can be assigned problems relating to morning reports and service records.

(7) Officers can learn how to solve such problems as time length, traffic flow, and density of motor columns in close and open column marches through actual, first-hand experience.

d. Use of application.—Every instructor must be constantly on the alert for opportunities to use this stage of instruction in his teaching. One mark of a good instructor is his ability to set up situations that

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require his students to apply the principles or procedures he is teaching.

56. Types of application.—*a.* As used in Army instruction, application is of two types:

(1) Individual performance.

(2) Team performance.

b. Individual performance is emphasized in basic and technical training. The instructor has each student, working alone, perform a job requiring the use of new ideas or procedures, duplicate the procedure taught, participate in a discussion, write a brief report, solve a problem based on the principles presented, make a map, or analyze a situation for fundamental factors. These performances may be handled in several ways:

(1) *Supervised individual performance.*—The instructor supervises the class while each student works by himself at his own speed.

(2) *Group performance.*—An instructor and assistants direct the activities of students who are working together at the same rate. (See par. 75, FM 21–5.)

(3) *Coach-and-pupil method.*—The students, paired off, act alternately as instructor and student under the general supervision of the instructor and his assistants. (See par. 76, FM 21–5.)

c. Team performance is emphasized in tactical, logistical, and advanced technical training for situations where units operate together (see sec. VIII, FM 21–5). The instruction of personnel in the principles and procedures of military science and the development of an efficient fighting team can be secured only through practice in applying these principles and procedures in the solution of field problems.

Section II

INDIVIDUAL PERFORMANCE

	Paragraph
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Advantages of individual application	58
Cautions to be observed	59

57. Procedures in individual performance.—*a. Preparation and planning.*—Preparation and planning are as important for application as for presentation. They include determining when the application should be used, what facilities and space are necessary, and how long a period of time is required. The instructor must have available those visual aids, films, or film strips that will assist him in conducting the repeated explanations and demonstrations that may be required, and the reference materials to which students can be referred for answers to their questions.

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(1) *Initiating the application stage.*—Men should apply their learning as soon as they have mastered the fundamental ideas of a lesson or the basic operations of a procedure. The time for practice is as soon as the men are ready. For example, a brief demonstration of the use of sighting bar, together with a discussion of principles involved, will usually be sufficient to get the men ready to use this training device. On the other hand, teaching the preparation of the morning report is more complex and requires a longer explanation and



FIGURE 37.—Individual application—mechanic working on transmission.

demonstration than that required for the sighting bar. However, as soon as the students know the principles and procedures involved in keeping this report, they should be given practice in the actual handling of field problems.

(2) *Procuring equipment and working space.*—Procuring the equipment and space necessary to provide each student with an opportunity to apply what he has learned is a major problem of instruction. The fullest possible use of the equipment can ordinarily be made by a careful scheduling of the lessons to take advantage of the available materials; by building large-scale models; by using films and other

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illustrative materials to overcome shortages; and by breaking the lessons into simple step-by-step procedures, each of which requires a minimum amount of equipment. Securing adequate space may involve not only careful planning of the available facilities but also the use of makeshift shelters, tables in mess halls and barracks, and out-of-door classes.

(3) *Providing sufficient practice.*—The amount of practice depends upon the type of material, the stage of training, and the total length of time available for instruction.

(*a*) When the training time is limited, it is desirable to concentrate practice on the limited number of fundamental skills and principles.

(*b*) Because learning to put on a gas mask is simpler than learning the tactical principles of a penetration, less time will be required for the practice on the gas mask. Mastery in either case, however, can be secured only through practice.

(*c*) The time devoted to application also depends upon the stage of training; the advanced stages of instruction will emphasize application more than will the beginning stages.

(*d*) In all cases, practice should be continued until the student is able to perform the operation correctly and with the expected degree of skill; *there is no set time limit for this stage of instruction.*

b. Supervisory duties of instructor.—The instructor in this stage of training is a supervisor. He should—

(1) Be sure every student understands what he is to do. Although the instructor's presentation may have seemed complete, he should circulate rapidly through the group to see that every student knows the "what, where, when, why, and how" of the lesson. The instructor can ask questions or observe students to be sure each of them has started properly.

(2) Help men who are having trouble. The instructor should never sit at a desk and make the students come to him, nor should he use the application stage as a time to make reports, bring records up to date, or write letters. This stage of learning is a period in which the most efficient training can be accomplished only if utilized properly. He might use his assistants as coaches for those who most need help.

(3) Repeat the explanation and demonstration if he finds that the majority of the students have missed certain fundamental points. If only a few require additional instruction, assistants may present the necessary material, the better students may work with the men needing special help, or the instructor may take those men needing instruction to one side and present the materials to them again. In repeating the presentations, a change in the method and teaching ma-

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terials will probably be necessary, since the men have shown that they did not master the material as originally presented.

(4) Be sure each step of the procedure is mastered and reviewed before presenting the next one.

(5) Raise the standards of performance after the students have had an opportunity for some practice or have been given additional explanations and demonstrations.

(6) Be careful not to help the students too much. A word of caution, a brief correction, a question, "Why do you do that?" or "What is

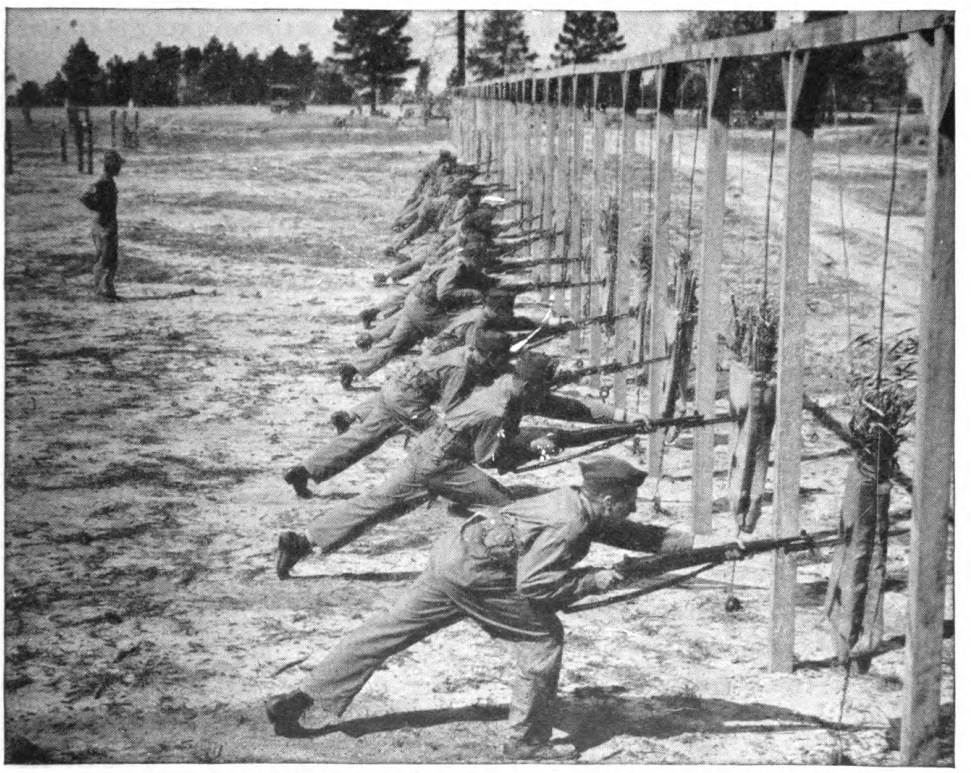


FIGURE 38.—Individual application—bayonet practice.

the purpose of this step?", will usually be sufficient, provided the explanations and demonstrations were adequate. If the instructor finds that more assistance than this is needed, he should carefully check his lesson plan and revise the presentation step to overcome difficulties which have developed during the application stage.

c. Emphasis upon student performance.—Learning by doing requires first, that the student understand the problem and second, that he be able to apply the correct procedures to its solution. Frequent student performance is necessary for the development of speed and accuracy in execution. In order to prevent wrong learning and the

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formation of faulty habits, however, student performance must be supervised by the instructor.

(1) The student expects to be told exactly what he is doing, why he is doing it, and how he can judge the success of his efforts. It is only after a thorough presentation of the lesson in this light that the students can be expected to learn efficiently in the application stage.

(2) A student should know how each operation is carried out and how it fits into the entire procedure. If he is solving a problem, he should know the fundamental principles involved, the situation, and the goal toward which he is working. For complex or complicated jobs and problems, it is frequently necessary for the instructor to provide written instructions.

(3) A student is expected to work more or less by himself or with a group of students to which he is assigned. He should be referred to, and advised to use available Technical Manuals, Army Regulations, charts, and demonstrations. He should plan his work, check the layout for the proper relationship of materials, and work systematically, using all available references or aids. In combat, men are on their own. The initiative and resourcefulness that often mean the difference between battle success and failure can be developed through application.

(4) The students should be given assignments they can satisfactorily complete in the time allotted. The feeling of satisfaction that comes from having done a job well and from having received recognition for it, will do much to develop the high morale that is a feature of every good fighting force.

d. General considerations.—(1) *The need for patience.*—Patience in analyzing student difficulties, answering questions, correcting mistakes, and repeating instructions is essential in the application stage. Sarcasm or ridicule must be avoided in answering questions, for questions show that students feel insecure or have missed one of the points of the presentation. More than that, they show that the students want to learn. If the question is off the subject or on points to be presented later, the instructor should say, "That point can be found in TM———. Look it up in the file of reference materials," or "We'll take that up later."

(2) *Variation in procedures.*—There is a fundamental difference in the procedures used in the application stage when skills are taught and when problems are solved.

(*a*) Skills or operations must be taught systematically and not left for the learner to discover. The soldiers or officers being taught an approved procedure should be told exactly what they are to do, why they are to do it, and how it is to be done; then they should be given

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an opportunity to apply the procedure. The emphasis should be on both speed and accuracy, but the attention of the student should be directed toward the exact operation or procedure he is learning rather than to the quality of his work.

(*b*) The solution of problems should be handled by emphasizing thought and reasoning. In solving problems, the students should be required to plan their work, to outline the facts and information that will be required, to list the basic principles involved, and to combine all these factors in making the required decision. The problems must be practical, challenging, and within the powers of the students. They should be similar to the types of problems the men will face in the field. The way in which a problem has been solved before is important, but it is more important that the students be able to develop a solution when the conditions of the problem have been changed. They should acquire judgment in estimating the relative importance of the various factors entering into the decision.

(*c*) In developing the materials for student practice, the instructor must select his materials, organize and present his lesson in such a way that the students will be learning either the solution of problems or the acquisition of skills. The instructor, in basic and technical subjects, will emphasize skills and procedures; while in tactical and advanced courses, he will emphasize the solution of problems that require judgment.

(3) *Prevention of wrong learning.*—The instructor must be on the alert to prevent the formation of faulty habits of procedure or thinking (see fig. 39). Faulty habits are as readily learned as are correct ones, and, once formed, make the learning of correct procedures and principles difficult. It is only through careful supervision of the application that faulty habits can be detected and eliminated before they become a hindrance. The instructor should ask questions, observe the students at work, and check the solutions of problems.

(4) *Setting standards of achievement.*—One phase of supervision is setting the standards of achievement to be attained by the student. In the initial application of a principle, emphasis should be upon completeness and accuracy. In carrying out a procedure, the students should try for both speed and accuracy, but the emphasis again should be upon the latter. After an initial application and a repetition of the presentation, the standards of the second application stage should be higher, and less supervision should be necessary. The instructor should expect his students to perform an operation faster and more accurately, or to solve a problem more quickly and with better judgment after practice and a repetition of the presentation. He should not

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expect them to do a job that is still beyond their ability. The instructor's judgment of the ability of his students develops through experience, but, if he is conscientious in his analysis of the problem and considers the solution that the students have turned in previously, his judgment will be sound.

(5) *Use of competition.*—An effective motivating device for this stage of instruction is competition. The students can compete with their past records, with each other individually and in groups, and



FIGURE 39.—The instructor must correct errors before students form habits that impair efficiency.

with standards set by the supervisor. Care should be taken that the competition is not carried to a point where ill-will may result. Competition, properly controlled, will lead to whole-hearted effort. Improperly handled competition will lead to a situation that will make teamwork difficult if not impossible. (See par. 67.)

58. Advantages of individual application.—*a. Increases speed of learning.*—Requiring a man to perform an operation in the early stages of learning increases the speed with which he will learn, because it will emphasize the proper techniques, utilize different senses,

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point out to him his errors, and add emphasis to the fundamental points of the lesson.

b. Puts theory into practice.—Skill and speed in carrying out an operation or in using theories and principles in the field can be acquired only through practice. This practice cannot be developed in an instructional program that utilizes only lectures and demonstrations. The soldiers and officers must be given an opportunity to use the techniques and principles they have learned before the instruction in the lesson can be considered complete.

c. Prevents formation of faulty habits.—Faulty habits can be prevented only through correct learning. Supervision of application insures that correct procedures and habits will be learned.



FIGURE 40.—Individual application—soldier corrected for firing in sitting position.

d. Shows relation to combat success.—The problem of relating lessons to battle success is simplified when the students solve problems or learn skills related to field conditions.

e. Provides a check on the instruction.—The application stage tests the effectiveness of the presentation stage of the lesson. If the stu-

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dents are able to carry out the procedure, or to apply the principles they have been taught, the instructor knows that he has presented his material well. If they cannot, the application stage will indicate which weaknesses in the lesson must be corrected by a repetition of the explanation or demonstration. Knowing these, the instructor can revise his lesson plans so that future lessons will be presented properly.

59. Cautions to be observed.—*a. Applications not suitable for presenting new materials.*—This technique cannot be used to introduce new materials. It is a stage of learning that must follow the presentation of new ideas or skills. If, for example, an instructor has his students attempt to apply the principles of an enveloping movement by a mechanized force in the attack before they know the limitations of mechanized equipment and the effect of terrain upon such movements, he will find the students unable to cope with the problem.

b. Different techniques needed for teaching skills and problem-solving.—The techniques of application that will be used in teaching skills and operations differ from those used in teaching problem-solving. The instructor who uses the same procedure in teaching students to remove stoppages in a machine gun that he uses in teaching the means of security against mechanized attack can expect failure. This variation in procedures required in teaching skills and in presenting principles is covered in paragraph 57*d*(2).

c. Adequate equipment and facilities needed.—Applications require more equipment and facilities than do most lectures or demonstrations, because every student must be given an opportunity to use the equipment or to solve the problems for himself. Such equipment may consist of mimeographed sheets, working models, or the materials issued for field use.

d. Instructor must not give too much assistance.—The instructor must use restraint in assisting his students. Otherwise, there will be too little emphasis upon student analysis and activity. *The application stage can be used to develop initiative and self-reliance and the use of a self-check habit.* This does not mean that the instructor can excuse himself from giving his students considerate and patient assistance when they need it, but the students must realize their own responsibility in carrying the operation to successful completion.

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SECTION III

TEAM PERFORMANCE

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60. Team performance in Army instruction.—*a. Modern warfare places a premium upon teamwork.*—Battles are made up of hundreds of small combat actions—a group of riflemen, supported by a mortar, captures a machine gun; a rifle squad, supported by machine guns, holds an important point; larger infantry units advance under the protection of barrages laid down by the artillery; infantry divisions cooperate with armored forces and air forces. In every case, success depends upon the combined effort of the individuals within a group and upon the cooperation of one group with another. This is teamwork. But teamwork is not confined to combat troops only. Behind the battle lines, engineers, signal troops, quartermaster troops, medical troops all work in small teams and cooperate with each other to accomplish their missions. Modern warfare demands the concerted effort of multitudes of well-trained teams.

b. Team performance is used to train units to perform their functions efficiently.—It is that phase of military training which is designed to develop the teamwork and leadership necessary for success in war. It has a major objective: the cooperation of individuals in accomplishing the group mission. Only through extensive practice as members of a team working on field, supply, and personnel problems can individual men attain this goal. This training is continuous, increasing gradually in complexity, but with the emphasis on the type of problem the men will face in the field.

c. Team performance must follow preliminary instruction.—As in individual performance, the men must be familiar with the principles and operations to be carried out. Some type of presentation—a lecture, an explanation, or demonstration as described in paragraphs 31 to 48, inclusive, must precede the team performance. Such a demonstration, however, might be that of any unit: a headquarters unit, a message center communication team, a medical detachment, a combat team, or a transportation unit. Without this preliminary instruction, the

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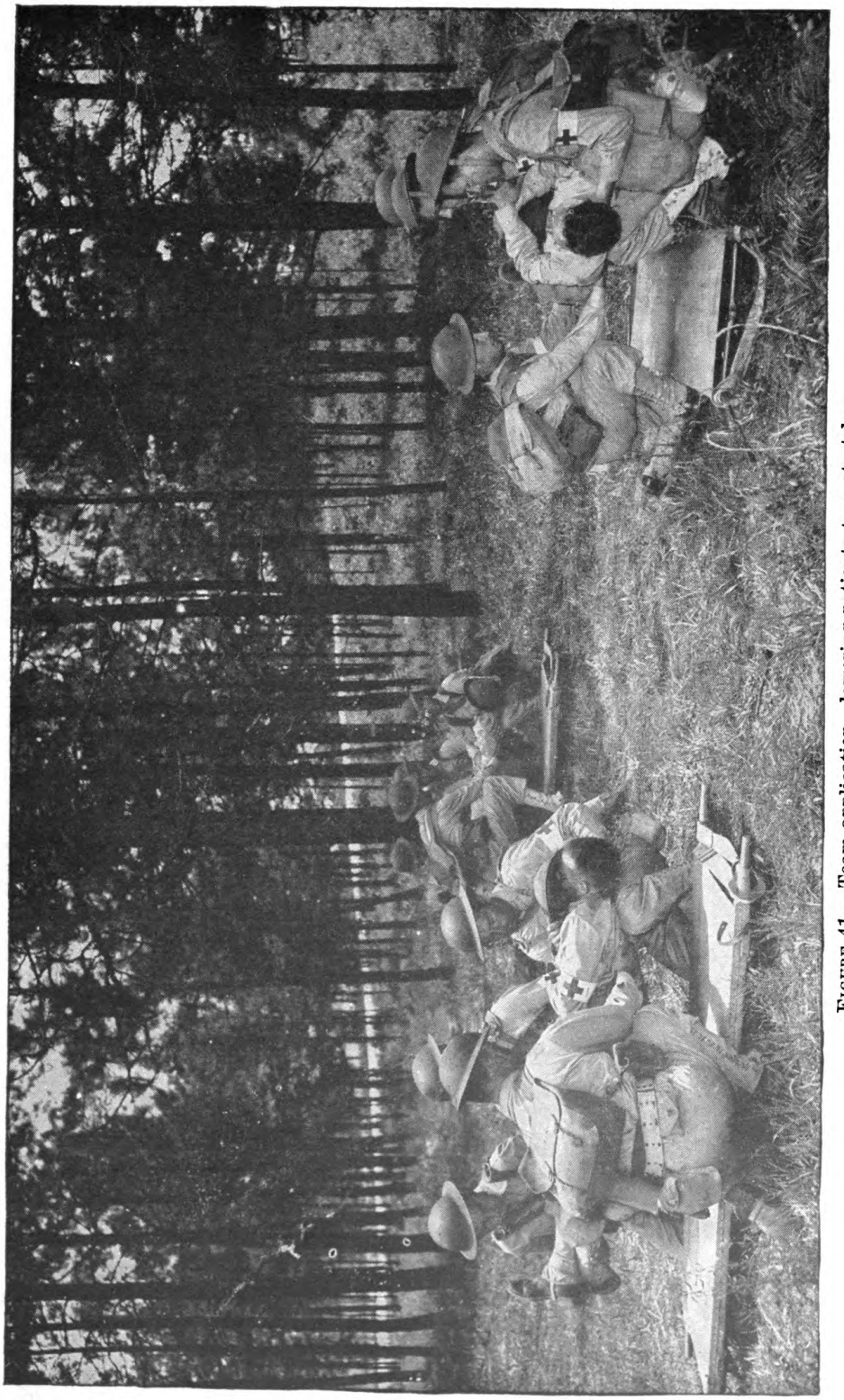


FIGURE 41.—Team application—lowering patients to a stretcher.

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men will not know exactly what they are to do, how it is to be done, and why it is carried out that way.

d. The instructor becomes a director and critic.—He carries out functions similar to those performed in a theatrical play by the scenario writer, the director, the stage manager, and the newspaper critics. The students are the actors. Each has learned his individual part and now performs with the cast in a rehearsal. The students practice together to learn proper timing, correct positions and procedures, and an appreciation of the part each man plays in the team operation.

e. Applicatory tactical exercises have long been used by the Army.—Their importance in developing teamwork, morale, and the field training necessary for combat success is well known. Paragraphs 104 to 121, inclusive, FM 21–5, present in detail the principles and procedures to be used in such tactical exercises: definitions of suitable means, the preparation of these exercises, the forms used in the statement of the situation, and notes upon the tactical elements of the exercise. Before an officer-in-charge of training conducts team performances, he should master this material thoroughly.

61. Procedures in team performance.—In team performances the exact method to be used depends on the purpose and the stage of training. Paragraph 106, FM 21–5, presents the important points in preparing for an applicatory exercise. The weaknesses of many exercises are traceable to a lack of imagination, a failure to realize the purpose of team training, or to an ignorance of present day methods of warfare. Examples of such ill-planned problems are found in situations in which officers take a school problem used in the past and fit it blindly to an entirely different situation. Such practices must be eliminated. Whatever the decision as to the objective and time of training, the plans for each exercise or problem should be checked for—

a. Necessary preparation.
b. Preliminary instructions or orders.
c. Technique of execution.
d. Critique summarizing the application.

62. Preparation for team performance.—As in every other stage of instruction, the plans for a team performance must be carefully worked out in advance by the instructor or officer in charge.

a. Selecting the problem.—The question "What sort of problem should be assigned?" can be answered only in terms of the objectives of the training program. The problems should be clearly related to field operations, demand the application of the procedures and principles taught in the preliminary training stages, and require team

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cooperation. In setting up a problem, the instructor or training director should restrict the earlier problems to those requiring the application of only a few principles or procedures. Just as a lesson plan is ineffective if too many new ideas are presented at one time, so a team performance that calls for the use of too many procedures or principles in the early stages of unit training will tend to confuse the personnel and, at best, be an inefficient training exercise. Each successive problem or team performance should require the use of more and more of



FIGURE 42.—Team application—37-mm antitank gun crew.

the fundamental ideas and procedures. The climax would be a field maneuver lasting for several days.

b. Selecting the time.—The question as to when to use team performance can be answered by the statement "as soon as the men are ready." The men will be ready for team performance as soon as they have mastered the fundamental operations or principles. A team performance involving the simpler concepts, such as organizing the defense of a bivouac against air and mechanized attack, can be introduced in the earlier stages of the training program. The instructor should analyze the training program in terms of the training requirements and schedules, and should plan team performances as early in the program as possible. (See par. 9, FM 21–5.)

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c. Using terrain and equipment.—A problem or exercise should be practical in terms of the available terrain and the equipment.

(1) *Terrain.*—In a tactical problem it is frequently found that cultivated farmlands restrict troop movements. The problem, then, would be one that in terms of such restriction could actually take place. A limited area of uneven or wooded ground can be used for presenting a number of tactical principles provided the officer in charge uses his ingenuity and knowledge of such principles in designing the problem. For example, an orchard can be used for both attack or defense situations, or it could be used for a reconnaissance patrol problem. The limitations of the available terrain can be supplemented by the use of sand table exercises. These can be used in the early stages of instruction in place of a troop demonstration to give the units an over-all view of the tactical situation. A similar exercise can be given at the conclusion of a command post or small unit exercise in connection with the discussion or critique. One objective of an instructor or director of training should be, however, to take the fullest possible advantage of the available terrain.

(2) *Equipment.*—Every operation requires facilities and equipment. It may be necessary for the officer in charge to provide transportation, weapons and ammunition, field rations, and an adequate water supply. If a tactical operation is being considered, the terrain should be checked by personal reconnaissance. The officer should be sure that the operation is feasible in terms of the available facilities and equipment. The problem should call for only those materials normally available to the individual soldier or unit under combat conditions. The use of models or makeshifts should be kept at a minimum.

d. Assistants and umpires.—A team performance will frequently require the use of demonstration troops or a number of assistants or umpires. The officer in charge must arrange to secure such troops or assistants and rehearse or instruct them in the exact procedures and functions they will perform. The training in a tactical operation will be weakened by a poor demonstration or by the use of ill-trained umpires as much as by an inappropriate problem.

e. Making the problem realistic.—Making a team performance realistic is a problem that calls for maximum ingenuity by the instructor or director. Shortages of equipment, restrictions of space, the necessity for assumptions as to the enemy disposition, activities, etc., tend to make a team performance unrealistic. (See par. 87, FM 21–5.)

(1) If the problem is that of training message center personnel, the message center can be camouflaged, operated with emphasis upon secrecy and coordination of all phases of communications; and the problem can be run either at night or during the day. The obstacles

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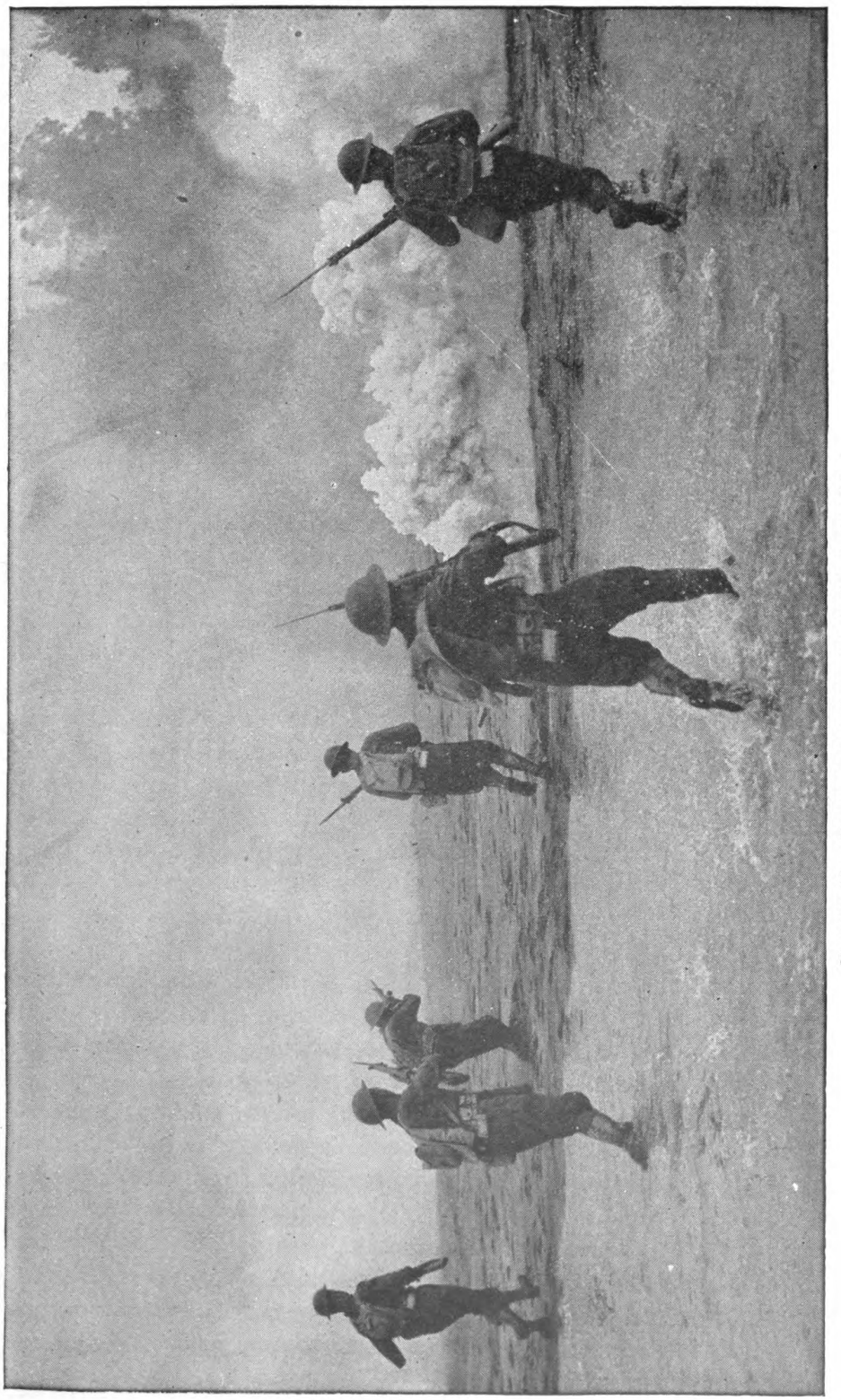


FIGURE 43.—Team application—combat unit in attack.

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that would be met would consist largely of interruption of communication lines, the imaginary use of other means of communication, and the restriction of blackout and camouflage requirements.

(2) Small combat unit problems involve more than restrictions upon facilities and equipment. A combat team operates under great difficulties in terms of noise, perils of movement, and other hazards. The training of such teams can be facilitated by the use of a number of training expedients. An ordinary Fourth of July bomb makes a good substitute for bursting shells; an impassable area can be marked with barbed wire or covered with a combined smoke or tear gas cloud; a road block can be represented by the use of a wagon, a few empty boxes, or a log. Such road blocks can be guarded by one or two riflemen who have been provided with a large supply of blank cartridge ammunition. If all the personnel are informed of the exact purpose for which each of these training expedients is set up and are told how the positions are being defended, the disposition of the enemy, and their supposed strength, they will respond to the artificial situation with whole-hearted activity. The instructor or director should realize, however, that a long list of assumptions and suppositions complicates a problem situation so much that soldiers are soon bored or confused. The problem should be simple and as realistic as possible.

(3) Transportation of supplies or the use of mechanized equipment frequently requires cross-country operations. Truck drivers must be taught to handle their vehicles in any type of terrain, and tank or half-track teams will find the larger part of their field problems will consist of cross-country work. The use of roads or well-beaten driving courses in the early stages of training is understandable. However, as soon as the personnel have learned the basic skills and principles of their duties, the team should work as a unit under the most adverse conditions the training director can set up.

(4) The leader of each section, squad, or platoon in an exercise must be instructed to prevent men from disregarding any of the assumptions or procedures that are used to make the problem realistic. Tactical exercises are the only feasible means of giving personnel thorough training in the essentials of combat operations. Men can be taught the importance of surprise and concealment, the need for prompt action, the techniques for patrolling and scouting, the proper use of cover, appropriate action under enemy observation or fire, and the use of the most efficient weapon at the right time and place.

f. Use of time.—Every minute of the training time should be put to use. In actual combat, reserves may be kept out of action for

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hours or days; but for training purposes, there is something radically wrong with an exercise that holds platoons or companies idle in swamps or sun-baked roads. A timetable or schedule of operations is necessary in order that every step of the performance may be executed to provide efficient training. Even the simplest team performance requires the time of several men, and this time should be well used.

g. Determining standards of achievement.—The instructor is faced with the problem of determining what standards of performance to expect. Personnel who have been trained only in the classroom will be unable to apply their training in the field without some additional instruction. These men should not be expected to show the high level of performance of men whose training from the first has been in terms of specific field operations. Furthermore, the first application of any procedure or principle should not be judged by as high standards as the third or fourth application.

h. Instructor's plan.—The instructor should outline his plans for the problem, including his timetable, schedule, and the necessary materials and facilities. A written plan provides a check list that prevents the omission of any important features. This will also allow the instructor to submit his plans to other officers for review, thereby eliminating ambiguities, improper procedures, or the use of problems that are too difficult for the present stage of training.

63. Preliminary instruction in team performance.—Preliminary instruction will be necessary to orient the men for the exercise. The men already know the separate phases of the problem, but they should be informed of the team objective, the reasons for this operation, and the importance of proper coordination.

a. Arousing interest and cooperation.—Knowledge of the exercise is important in arousing the interest of the men and securing their cooperation. The instructor should let every man know just what his job is, who is to be the leader, what the team as a whole is doing, and how they will attain their objective.

b. Presenting basic operations.—The instructor should review the basic operations if the exercise is taking place in the early stages of the training program. A brief discussion, or illustrated lecture, of the basic principles will be sufficient provided the preliminary training has been adequate.

c. Setting the stage.—The preliminary instruction sets the stage for the operation. The instructor should inform the men as to the supposed enemy strength, disposition, and activities, and the essential details of their own organization and course of action. For example, if the team performance is to train message center personnel, the loca-

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tion of the message center, the headquarters it is serving, and any enemy activities to be guarded against should be presented to the men so that the operation will approximate field conditions.

d. Making preliminary instructions impossible to misinterpret.—The preliminary instructions, checked beforehand, should be brief and clear. Every instructor should realize that instructions or orders that can be misunderstood usually will be misunderstood.

64. Technique of carrying out team performances.—*a. Emphasis on student activity.*—Because a team performance emphasizes student activity, the instructor will keep as much in the background as possible. He will not be both an umpire and a participant. He should not stop a procedure or operation unless an error occurs that would cause the men to learn incorrect habits or procedure. The commissioned or noncommissioned officers in charge of the operation should work out their problems and give their orders as though they were facing an actual field situation. If it is apparent that the operation is not going according to schedule, one of two possible errors occurred:

(1) The preliminary instruction was inadequate.

(2) The type of problem set was too advanced.

b. Emphasis on professional ability.—An exercise should lay emphasis upon the soldier's professional ability. It should build up his alertness, tenacity, endurance, and self-confidence as a military man or as a military technician. The importance of team performance in conditioning combat troops is widely recognized, but its corresponding importance in training other soldiers is not so well appreciated. The training and morale developed through a well-designed team exercise produces that initiative and skill so vital not only in a rifle squad or a bomber but also in the communication sections and all the rear echelon units. Such exercises demand hard, careful training and plenty of practice on well planned problems.

c. Specific training.—The training given in the exercise should be specific. Team or unit instruction that is too general in nature, that uses false situations, or that condones carelessness in execution is worse than useless. Such training may provide humor in maneuvers or in the training area, but it will bring death and disaster on the field of battle.

d. Developing initiative.—The instructor or director should provide opportunities for his men to use their imagination, ingenuity, and initiative in solving the problem. Combat units on patrol should be ready to meet unexpected resistance or surprise counterattack. Facilities and equipment will break down, and the service organizations must

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be able to carry out their functions under the most adverse conditions. Since war leads to situations that are vague, uncertain, or ambiguous, some training in exercises of this type will have value in giving the officers in charge an indication of the ingenuity of the men under their command. Such ambiguous situations, however, should be used only in the later stages of training. (See pars. 48 and 60, FM 21–5.)

e. Team try-outs.—An instructor will find that changing the duties of his personnel from time to time will not only train all men for all the jobs but will indicate the best combination of personnel for the regular operations. Just as a football coach shifts a tackle to full-



FIGURE 44.—Team application—tank crew.

back position or a guard to end, so a man on a mortar squad may be shifted from gunner to assistant gunner to observer. Each man, as soon as he qualifies for any position, should be given a chance to work in that position with the team. A fair try-out may indicate that the original line-up is not the most efficient one. The instructor or director will frequently find that some feature of his problem or some aspect of his previous instruction should be modified to secure more efficient team cooperation.

65. Planning for the critique.—A team performance is a major training step, and the instructor or director must plan his critique as

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carefully as his problem. He will watch for specific examples of good and poor performances, make brief notes on the techniques and procedures used, and set the standards he expects of his men. Every officer conducting a critique will be thoroughly familiar with the tactical or technical principles of the applicatory exercise as well as the technique of conducting a critique (ch. 6).

66. Advantages of team performance.—*a.* Team performance directs the attention of all the men to the purpose of military success in combat. It is truly training for field service. Through the use of well-designed and properly timed team performances, all personnel are kept interested in learning to become well-trained soldiers.

b. Team performance is one means by which the instructors and officers in charge of training can find potential leaders among the men. By changing the positions of the personnel from time to time, the best combination of personnel for the unit can be secured and the potential leaders picked out.

67. Cautions in use of team performance.—*a.* An instructor in setting up a problem requiring teamwork must be careful not to develop ill feeling among his men. Competition is desirable as an effective, motivating device; but if used indiscriminately, competition may undermine the morale and spirit of the organization.

b. The instructor must be careful not to lose sight of the training objective in setting up problems. The aim of military training is success in combat, and every phase of the Army's activities is directed toward the attainment of that goal.

c. The instructor must avoid problems that require the application of too many newly presented principles or procedures. Only a few related principles can be mastered at one time. Extensive maneuvers will be of little value until the men have mastered the fundamental principles of their job. On the other hand, small problems requiring only a few hours to execute and dealing with a limited number of procedures or operations can be used early in the training program.

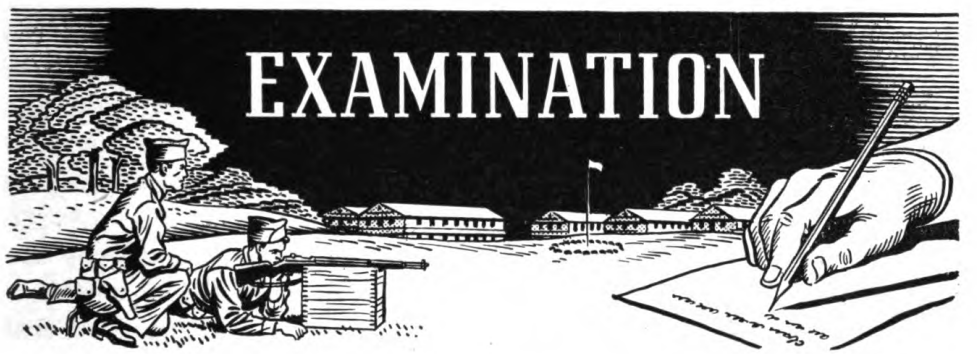
d. In setting up a problem, the officer in charge should consider the exercise as a training situation. If the training objective is to harden men, a long hike is effective provided such hikes are planned in terms of the entire training situation, the condition of the men, their other assignments, etc. Likewise, 2- or 3-day maneuvers give men a picture of field operations that can be secured in no other way. But while the men are learning the elementary procedures or principles, an assignment that results in their missing food and sleep will hardly be efficient. The officer in charge should make provisions for the proper

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timing of the operation and, if necessary, transportation should be provided and field kitchens set up.

e. A team performance requires more time than nearly any other stage of military instruction. The problem should call for a reasonable amount of training time and should be scheduled at the place in the training program where it will be most effective. This requires planning and extensive preparation on the part of the instructor.

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CHAPTER 5

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SECTION I

GENERAL

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68. Types of tests.—*a. What is a test?*—A test or examination is any device that is used to evaluate student performance. Tests may be used to estimate the degree of skill or amount of information a student has acquired, or to indicate his aptitudes, attitudes, abilities, and personality characteristics.

b. Test classification.—The different types of test situations most frequently used in the Army may be classified as to—

(1) *Purpose of test.*—Tests may be classified according to the purpose they serve as—

(*a*) *Selection or aptitude tests*, in which the knowledge or skills of the students are used as a basis for selecting men for training. Tests of general ability to learn or to profit from special types of training are widely used in the Army.

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(*b*) *Achievement tests* which are used to estimate the degree to which each student and the whole class have mastered the materials taught, as well as to indicate specific gaps or strong points in the students' learning. They also may be used to measure student attainment and instructional efficiency. Such tests are the ones most frequently used by Army instructors.

(2) *Form of test.*—Tests may be classified according to their form as—

(*a*) *Oral question-and-answer examinations.* Oral questions are used by instructors in nearly every lesson. In order that the evaluation may be accurate, as much care must be used in devising good oral questions as is used in constructing good written or performance test items. (See par. 39.)

(*b*) *Written tests*, in which the student records his responses in writing. Written tests are used in almost every course at one time or another, perhaps most frequently as final examinations. Their greatest value is in measuring rapidly the degree of information which a student has; but in a comprehensive examination program, they must be supplemented by performance tests and observations. (See secs. IV and V.)

(*c*) *Performance tests*, in which the student carries through an operation or procedure and is graded by the instructor on the quality of the work, as well as on the speed and accuracy of the performance. Such tests are the most direct method of measuring the ability of the student to do a job and should be used whenever possible. Examples are having students make wire splices, set up machine guns, or fill out morning reports. (See sec. III.)

(*d*) *Observation tests*, in which the instructor or an observer uses a check list or a rating form, or summarizes the results of an interview. Observation techniques are of the greatest importance in Army training because many phases of student achievement and behavior, such as leadership, cooperativeness, initiative, and persistence cannot be evaluated by the more formal types of test situations. Consequently, instructors, platoon or company commanders, or officers in charge of training will use check lists, rating forms, and interviews to secure a more complete picture of the student's performance. (See sec. VII.)

69. Purposes of testing.—*a. Evaluating student's learning.*—One of the most important tasks which an instructor has is to determine how well his students have mastered what they have been taught. To attain this goal, each instructor must make frequent and accurate estimates of the student's performance. Properly constructed examinations will assist instructors in making these estimates.

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b. Insuring fairer standards of evaluation.—Frequent tests are one of the best ways of evaluating students fairly, and their use tends to overcome the inaccurate and hasty judgments and opinions of a student's performance. Tests also help to establish fairer standards upon which to appraise students in situations where different instructors handle the same class. The frequent use of good tests results in greater fairness to the men and in greater over-all efficiency to the Army.

c. Discovering gaps in student learning.—Tests may be used to discover specific weaknesses or gaps in the student's mastery of information and skills. Such weaknesses can then be corrected by repeating the instructional materials.

d. Aiding learning.—A test is a teaching device in that the students tend to remember longer and more vividly the points covered in an

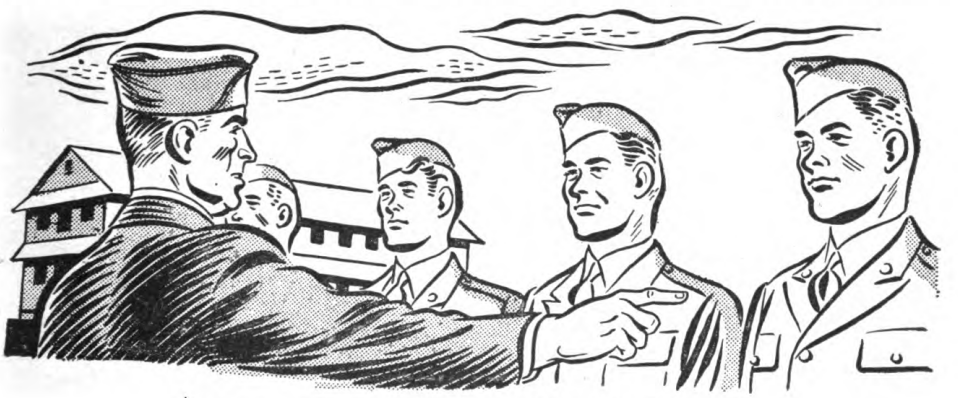


FIGURE 45.—A test can be used to rank students.

examination. Tests given periodically will encourage the students, as well as the instructor, to review the materials that have been presented and to organize the different phases of instruction into a meaningful set of skills and information.

e. Evaluating and improving instruction.—The results of a well-planned testing program will assist the various commanders in evaluating and supervising their instructional program. The test results will indicate whether or not the students are measuring up to predetermined standards of performance and whether or not an instructor is presenting all the important points of the lesson properly. Thus properly constructed tests are measures of instructional efficiency.

70. When to test.—The more measures an instructor has of a student's skill and information, the more confidently can he appraise the man. In the Army, observations of student performance should be continuous; and test situations covering the essential materials

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should be set up at the conclusion of each lesson, job assignment, subject, and course. Because of the limited time available for testing, examinations should be limited to fundamentals. Lesson examinations will of necessity be short; but the tests given at the end of a job assignment, subject, or course, should be as comprehensive as possible.

71. Responsibility for testing.—*a. Commander.*—The development and use of examinations, because they are a phase of training,



FIGURE 46.—Oral examination on traffic problem.

are responsibilities of each commander. He will, however, usually delegate these activities to—

(1) The instructors and officers in charge of training.

(2) A test section in charge of an officer experienced in educational, vocational, and psychological measurement.

b. Instructor and officers in charge of training.—Each instructor, as well as the officer in charge of training, faces the problem of developing tests to measure the progress of students in mastering the skills and information taught. In general, the instructor will be responsible for developing the shorter examinations used at the end of each lesson or job assignment, while the officer in charge will supervise the construction of subject and course tests. All tests, how-

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ever, should be checked by a training officer skilled in test construction and use.

c. Test section.—The development and proper use of tests require as much skill and experience as any other military specialty, and the importance of proper testing to the success of the total training program demands that special attention be given to it. Sound testing procedures can be developed most efficiently through the assistance of a test section staffed by personnel selected on the basis of experience in educational, vocational, and psychological measurement, in teaching procedures, and in the statistical analysis of test results. The responsibilities of the testing section should be to—

(1) Assist the officers in charge of training and their instructors in developing, improving, and interpreting the tests used in the instructional program. This will include checking the various examinations for validity and reliability, and indicating procedures to be used in improving them. (See pars. 72–74.)

(2) Administer the longer, more formal examinations used at the end of the subjects and courses.

(3) Analyze and interpret test results and to present the information in a form readily usable by the commanding officer, so that he will be able to estimate the efficiency of his training program and to make recommendations for improvement.

(4) Develop measures for the selection of personnel for special training.

SECTION II

CONSTRUCTION OF TESTS

	Paragraph
What to measure	72
How to measure	73
Building a good test	74

72. What to measure.—The first question an instructor must ask himself as soon as he knows that a test is to be given is, "What am I trying to measure?" In answering this question, he must know what he expects his students to master as a result of his instruction.

a. Determining scope of test.—A test should cover the attitudes, abilities, skills, principles, and facts presented in the lesson, job assignment, subject, or course on which student performance is to be evaluated. These materials and skills should be stated in such a way that the student's performance will give an estimate of how well they can perform jobs in the field.

b. Deciding what to measure.—There are three steps that the instructor should use in deciding what to measure:

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(1) Analyze the objectives in terms of the general purpose of the training, making a precise indication in each case of how much the student is expected to get out of each objective. (See par. 13*c*.)

(2) List the various phases of the teaching assignment and indicate for each phase a definite formulation of the answers to two questions:

(*a*) What is the purpose of this phase of instruction?

(*b*) What are the students expected to learn in this phase of instruction?

(3) Combine the results of the two preceding steps in outline form. This outline will indicate what phases are to be measured; the three

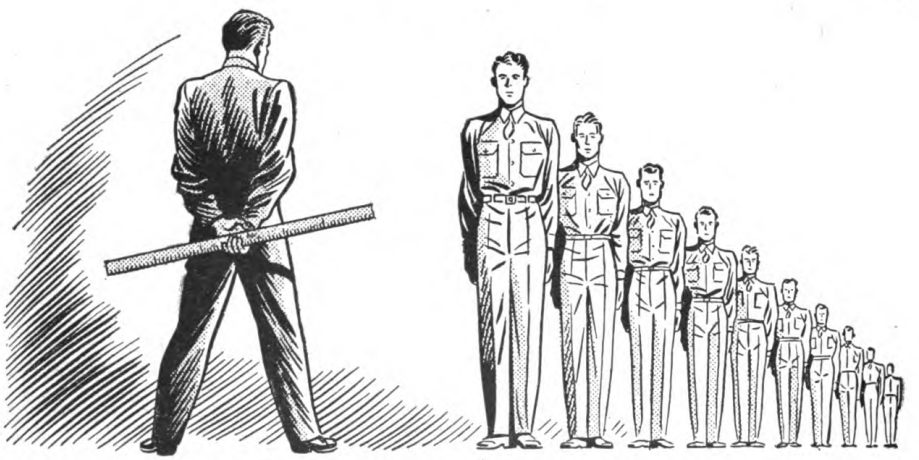


FIGURE 47.—What to measure is a problem of test construction.

steps are necessary in order to insure that all important points will be covered by the test.

c. Selecting items or questions.—The limited time allotted for testing requires the instructor to select carefully the tasks, questions, or problems he will use to check his students' mastery of the subject matter. The items should cover the important objectives and the essential skills and information. An examination samples the instructional materials but does not measure *all* that an individual knows about the subject matter. The value of the examination will depend upon how carefully the sample of questions is chosen to cover the important objectives, skills, and information itemized in the instructional plan and job analysis.

73. How to measure.—*a. Selecting test techniques for specific purposes.*—After the problem of what to measure has been solved, the instructor must next decide on the technique he will use. For each testing purpose there are some test or measurement techniques

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that are more effective than others. Knowing how to match test techniques and purposes will save the instructor much time. (See fig. 48 and secs. III to VII, incl.) If he has made a careful analysis of the teaching materials, if he knows what his objectives are, and if he knows some of the possibilities and limitations of the testing techniques, he will have little difficulty in matching test techniques and purposes. For example:

(1) If the purpose is to make certain that all students can make a wire splice in 5 minutes, the instructor could use a timed *performance test* in which the student actually makes a wire splice.

(2) If the purpose is to see whether the student knows how to work as a member of a team in moving a command post, the instructor could *observe* the performance of a group of students engaged in moving a command post.

(3) If the purpose of the test is to determine whether the students know how to fill out report of change cards, a *written test* can be used.

(4) If the purpose of the test is to determine the student's ability to express and develop his ideas on a tactical problem, the instructor can ask the student *oral questions* in class, or give him a short *written essay question*, or have him submit a *written report*. The choice among these techniques would depend upon the importance and depth of the question and the time available to both student and instructor.

(5) If the purpose of the test is to measure the student's general information relative to the entire course, a comprehensive selection of questions drawn from all topics included in the course is needed. This can best be obtained by using a test consisting of a variety of *new type* (objective) *questions* which require little or no writing on the part of the student. (See sec. IV.)

b. Practical limitations on selection of a technique.—An evaluational or measurement situation should be selected in terms of the exactness with which it fits the specific testing purpose. However, the demands of the training situation may require a compromise between the type of test best fitted for the job and the one that can be used. For example, the time allotted to testing or shortages of equipment may not permit the use of a performance test. Furthermore, an instructor's experience in constructing examinations and in selecting the important points to observe in a student's performance will influence the type of test he will use. Finally, the type of personnel being trained must be considered; for example, men with little schooling will, in general, not be at their best on a paper and pencil test. (See pars. 74, 80; sec. IV; pars. 93 and 95.)

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Testing purposes—To measure:	Measurement techniques															
	Oral questions	Performance	Essay	True-false	Cluster true-false	Multiple choice	Completion	Listing	Matching	Identification	Situation	Problems and reports	Check list	Rating forms	Interviews
1. Skill on the job	---	X	---	---	---	---	---	---	---	---	---	X	X	X	---
2. Ability to apply information and procedures in new situations	X	X	X	---	---	X	X	X	X	X	X	X	---	---	X
3. Understanding of facts, principles, procedures, etc.	X	---	X	X	X	X	X	X	X	X	X	X	---	---	X
4. Ability to solve problems	X	X	X	---	---	X	---	---	---	---	X	X	---	---	X
5. Ability to express and develop ideas logically	X	---	X	---	---	---	---	---	---	---	X	X	---	---	X
6. Ability to evaluate relative importance of factors in a situation	X	---	X	---	---	X	---	X	---	X	X	X	X	---	---
7. Acquisition of desirable attitudes	---	---	---	---	---	---	---	---	---	---	X	---	X	X	X
8. Possession of desired personality traits	---	X	---	---	---	---	---	---	---	---	X	X	X	X	---

FIGURE 48.—Selecting the best measurement techniques for specific testing purposes.

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74. Building a good test.—*a. Procedure.*—After deciding "what to measure" and "how to measure," the instructor must take into consideration the—

(1) Characteristics of a good test.
(2) Selection of the best items.
(3) Organization of the test.
(4) Final check.

b. Characteristics of a good test.—Although the ideal test has all the following characteristics, the first three are essential.

(1) *It is valid.*—This means that the test measures what it is supposed to measure; that is, if the test is supposed to measure a student's ability to do a job, it does just that. (See *c* below.) The instructor must incorporate in the examination those elements or items which relate to the essential instructional materials and eliminate the nonessential.

(*a*) The initial step in making certain of the validity of the test is to be certain each question or item deals with an essential point as shown by the job analysis and the statement of objectives (see par. 13).

(*b*) The final step is to discover whether men scoring high on the test succeed better in future training and in the performance of field activities than those scoring low. This step requires that the instructor evaluate the field performance of students who have taken the test.

(*c*) Only by carrying out these two steps can the instructor be sure that the test is valid.

(2) *It is reliable.*—A reliable test is one that accurately and consistently estimates a student's performance.

(*a*) Students' responses on reliable tests will be similar when they are tested repeatedly with similar testing devices, provided no further learning intervenes.

(*b*) Responses made in a reliable test situation will be evaluated in the same way by different instructors. Student performances will be evaluated according to the same standards, even if the test is given or scored at different times.

(*c*) A reliable test is free from various errors of test construction and administration, such as ambiguous directions, questions, or situations; item which may be frequently answered correctly by guessing; the use of too few items to cover the objectives and information being tested; variable or vague scoring standards; environmental distractions, and cheating. (See secs. III to VII, incl.)

(3) *It is comprehensive.*—The test should measure the students' mastery of the fundamentals taught in each phase of instruction.

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A good test will include items covering all teaching objectives, but the more important objectives should be represented by several items dealing with such objectives from different viewpoints.

(4) *It is easy to take.*—The directions for taking the test (or for each section of the test, if it has several parts) should be clear and complete enough that the student knows exactly what he is expected to do. Whenever feasible, sample questions correctly answered should immediately precede each type of item. For all types of questions, the students should be specifically directed where to put his answers or how to perform requested operations.

(5) *It is easy to score.*—Having clear-cut answers to questions or problems makes them easy to score. Whereas "objective type" written tests are easily scored, essay questions are not. (See pars. 78 and 82*c*, and fig. 49.)

c. Selecting best items for test.—Because a test is no better than the items of which it is constructed, the instructor must select carefully the items to be used. He should construct the original items at the time he prepares the lesson plans. The good items in a test are those which—

(1) Measure student ability or knowledge directly related to an important instructional objective. Each item should be checked against the lesson analysis and statement of objectives. While this is of special importance for the selection of items for short lesson tests, all test items should meet this criterion.

(2) Reveal differences (discriminate) between students of high, average, and low *ability to perform* the job for which they are trained. The discriminative capacity of an item is found by dividing the class into three equal groups, the most capable, less capable, and least capable, on the basis of the students' ability to do the job, and then noting whether more men in the most capable group pass the item than men in the least capable group. This check should be applied especially to items used in subject and course tests for ranking students; it should not be applied to tests of minimum essentials (tests on which all students are expected to respond correctly to all items).

(3) Show that a greater number of students *scoring high on the test* pass the item than students scoring low. By determining whether more students having total test scores in the highest third of the class pass the item than in the lowest third, the instructor can select those items which are consistent with the total test. This criterion should be used in setting up the final tests of a subject or course.

(4) Conform to the standards of test item construction as outlined in sections II to VII, inclusive.

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d. Organization of test.—Whether the instructor is planning to use a series of oral questions, a written test, a performance test, or a combination of these, he should organize the testing materials to best advantage.

(1) The wording of the questions, the directions, and the instructions for doing the job must be simple, clear, and concise.

(2) The test should be reasonable.

(*a*) If the test is to measure speed of performance, the time limit should be short enough to allow only the fastest workers to finish.

(*b*) If everyone is expected to attempt all the items, the number and the type of operations or problems should be selected with this purpose in view.

(*c*) The test should deal with those materials, attitudes, or operations which have been taught or which the students have had an opportunity to acquire.

(3) A limited number of different item types should be used. Not more than four or five forms of items, oral, performance, or essay, multiple choice, etc., should be used on one test. Directions for each form must be included.

(4) The answer spaces for written items of the objective form should be arranged along one side of the page, or in such a way that the scoring can be handled by means of a cut-out stencil or scoring sheet; or separate answer sheets should be provided. (See fig. 49.)

(5) A test measuring mastery of lesson fundamentals should include only items relating directly to the essential attitudes, skills, or information of the lesson that the men will need on the job for which they are being trained.

(6) A test measuring degree of mastery of a subject or course should include a few easy items as well as a few very difficult ones so that no student will make a perfect score nor will any make a zero score.

e. Content check.—Before the test is used, it should be submitted to officers and instructors familiar with the subject matter for review and criticism. This procedure is necessary in order to insure the elimination of undesirable emphasis upon unimportant phases of the instructional materials. The reviewing officers should evaluate the test items, directions, and organization in terms of the—

(1) Purpose of test.

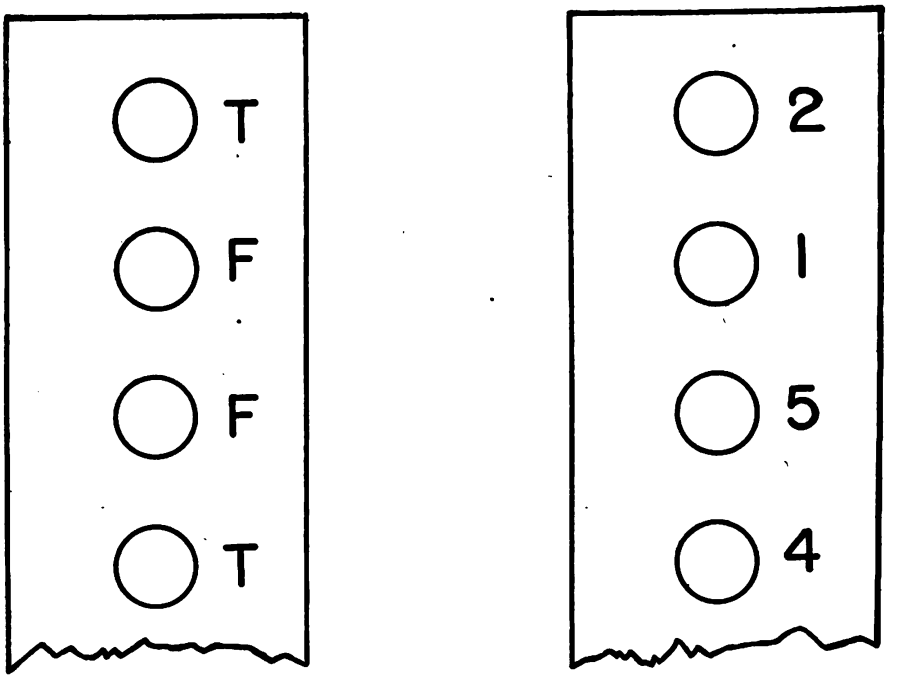
(2) Characteristics of a good test.

(3) Proper emphasis on "must know" and "should know" instructional materials.

(4) Type of personnel being trained.

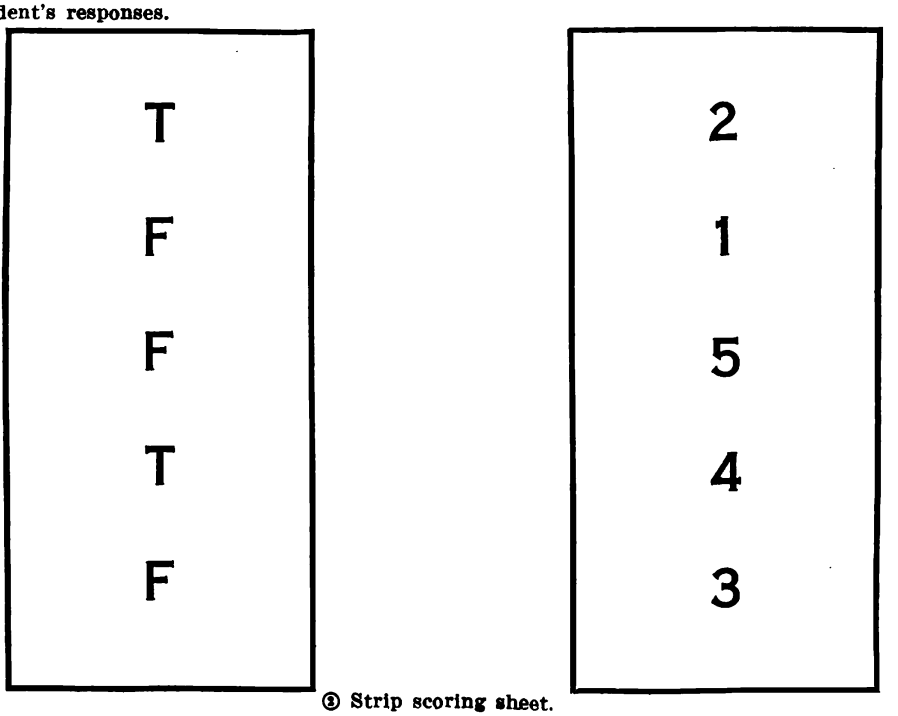
(5) Unity, coherence, and proper emphasis in the wording of questions or directives.

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① Cut-out scoring stencil.

The punched-out circles are arranged to correspond to the spaces provided for the student's responses. The correct answers are written to the right of the circles so that when the stencil is placed over the test the correct answers may be quickly compared with the student's responses.



② Strip scoring sheet.

The strip scoring sheet is a strip of heavy paper about 1 inch wide on which the correct answers are arranged to correspond with the spaces on the test for the student's responses. The strip is then placed beside the student's responses and the test is scored.

FIGURE 40.—Scoring sheet.

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f. Time check.—In all tests, especially written ones, a competent instructor or other qualified individual should actually take the test in order to determine the time required for administering it. Students should not be expected to complete a test in as short a time as an instructor; on the other hand a test may be found to be too short.

SECTION III

PERFORMANCE TESTS

	Paragraph
Purposes for which performance tests are used	75
Example of a performance test	76
Directions for constructing a performance test	77
How to administer and score performance tests	78
Advantages of performance tests	79
Limitations of performance tests	80

75. Purposes for which performance tests are used.—A performance test measures how well a student can do or perform a given piece of work. He is required to make, service, repair, operate, shape, assemble, or disassemble something. The student is checked on his speed and accuracy. The purposes of performance tests, many of which are closely related, include the measurement of—

a. Skill and information.
b. Ability to apply knowledge.
c. Ability to solve problems.
d. Aptitude for training.

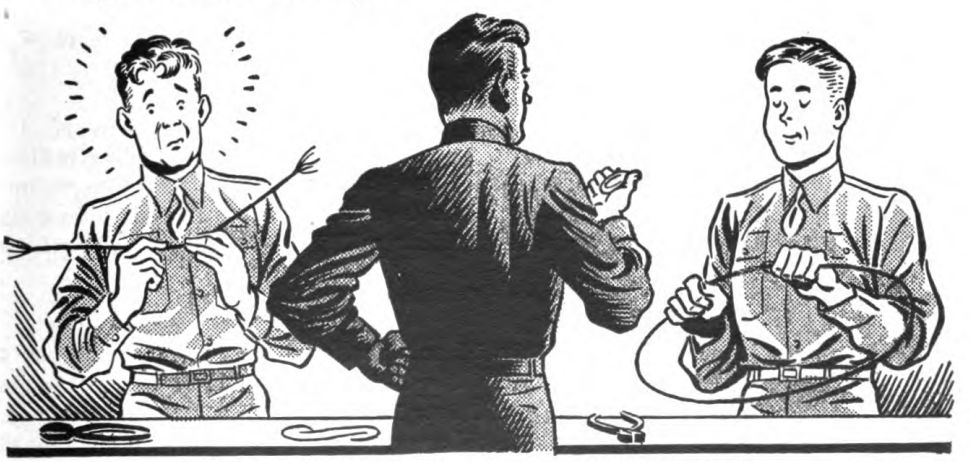


FIGURE 50.—An actual performance is the best test.

76. Example of a performance test.—The test, used in an Army service school, requires the student to wire and time an "in line" gasoline engine. It consists of three parts—directions to the student, directions to the checker or observer (an assistant instructor), and a check list for recording the results of the student's performance. An especially valuable feature of this test is the simplicity and clearness

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of the directions. They leave no doubt as to what the student or the checker is to do.

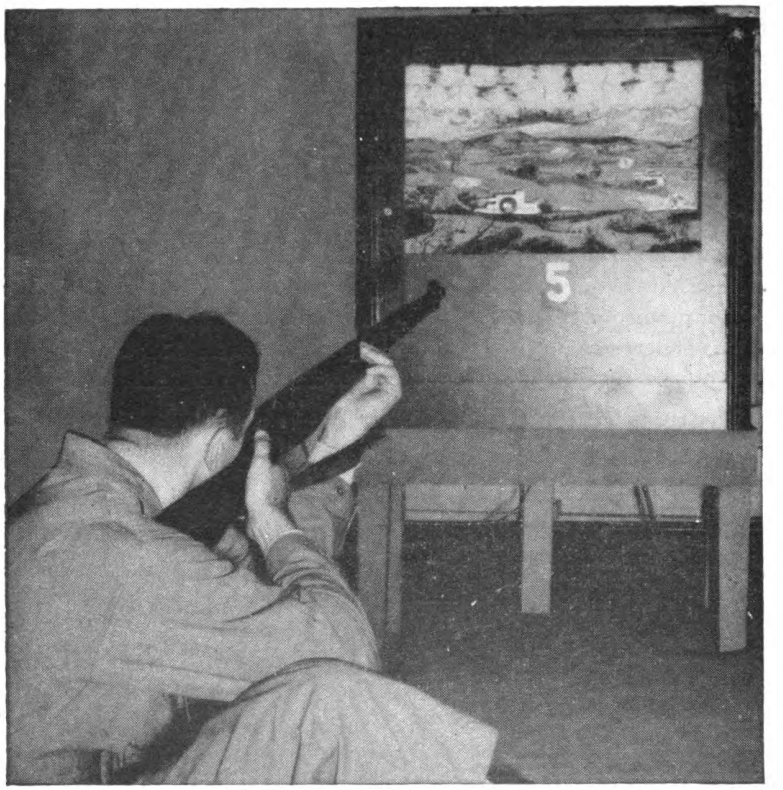


FIGURE 51.—Testing gunnery aptitude with electric-eye gun.

PERFORMANCE TEST

a. Directions to the student.—Wiring and timing an "in line" gasoline engine. This test measures how well you can wire and time an "in line" gasoline engine. How to wire and time an "in line" gasoline engine has been covered thoroughly in class. The necessary tools and equipment will be furnished. You will be checked on the following points:

PART ONE (5 points):

1. If you complete the task within 15 minutes, you earn a maximum of 5 points on this part of the test. One point will be deducted from the maximum of 5 points for every 5 minutes you spend over 15 minutes in solving the problem. You will be asked to stop work if you are not through with the task in 35 minutes. The following table shows the points you can earn in relation to the time spent.

Within 15 minutes—	5 points
15 to 20 minutes—	4 points
20 to 25 minutes—	3 points
25 to 30 minutes—	2 points
30 to 35 minutes—	1 point
Over 35 minutes—	0 point

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PART TWO (10 points):

2. The safety precautions observed while wiring and timing the engine.
3. The accuracy with which you wire and time the engine.
4. The extent to which the tools are used correctly and safely.
5. The extent to which the tools and equipment are cared for properly.

Directions for taking the test.

1. Report to the "chief-of-shift," as directed by the instructor, and secure the performance test check list. He will designate on the check list the time, the assistant instructor who will check your work, and the number of the engine on which you will work.

2. Report directly to the assistant instructor and give him the check list. Begin work as soon as possible. Remember, *the time started* is the time you leave the desk of the "chief-of-shift" and *the time completed* is the time you return to his desk. Any time you waste getting started gives you that much less time to complete the test.

3. When you have *wired and timed* the engine, get your check list from the assistant instructor and take it to the "chief-of-shift." He will record the *time completed* and determine your final grade on the test. The assistant instructor has observed and checked your work and graded PART TWO of the test.

4. Return to your engine and help the assistant instructor tear it down to prepare it for the next student taking the test.

b. Directions to the assistant instructor or checker.

1. Read very thoroughly the directions given to the student for taking the test. Be sure you understand the test and the method of marking before attempting to give it to the student.

2. Put the student to work as soon as possible. His "time started" on the test begins when he leaves the desk of the "chief-of-shift."

3. Observe and check the student *very carefully* on the items in PART TWO of the test.

4. When the student has completed the test, add the points earned in PART TWO of the test and record them in the proper space at the bottom of the check list.

5. Have the student return to the "chief-of-shift" to have the *time completed* recorded and his final grade totaled.

6. The student has been instructed to return and assist you in preparing the engine for the next student taking the test.

c. A check list is to be used in evaluating student performance. (See fig. 52.)

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WIRING and TIMING an "in line" gasoline engine

Student_____ Section_____ Date_____
Engine number_____ Assistant instructor_____

PART ONE (5 points): Time required to wire and time the engine.
Time started_____ Time completed_____

SCHEDULE OF TIME AND POINTS EARNED

Within 15 minutes—5 points	25 to 30 minutes—2 points
15 to 20 minutes—4 points	30 to 35 minutes—1 point
20 to 25 minutes—3 points	Over 35 minutes—0 points

(Student to stop test if not completed in 35 minutes)

Points earned by the student (Encircle one)_____ 5 4 3 2 1 0

PART TWO (10 points): Check student on each point.
Encircle the 1 (one) after the item if the answer is YES and 0 (zero) if the answer is NO.

A. CHECK WHILE STUDENT IS TAKING THE TEST.	YES	NO
1. Battery ground cable disconnected until wiring completed.	1	0
2. Grounded battery terminal tested for spark before connecting to battery cable clamp.	1	0
3. Engine starts the first time.	1	0
4. Student careful not to race the engine.	1	0
B. CHECK AFTER STUDENT HAS COMPLETED THE TEST.	**YES**	**NO**
5. Ammeter wired correctly.	1	0
6. Proper firing order at distributor and spark plugs.	1	0
7. Generator and control unit wired together correctly.	1	0
8. Ignition switch wired into circuit.	1	0
9. All tools used correctly and safely.	1	0
10. All tools and equipment cared for properly.	1	0

Points earned in PART ONE_____
Points earned in PART TWO_____
FINAL GRADE (possible 15)_____

FIGURE 52.—Performance test check list.

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77. Directions for constructing a performance test.—*a.* Examine the course of study to determine what portions of it should be tested by performance tests.

b. Provide the necessary tools and equipment.

c. Prepare directions for the students, stating the exact purpose of the test and operations to be performed.

d. Prepare directions for the examiner to follow while administering the test.

e. Prepare a check list for scoring the test.

f. Try out the test on a few students, or the other instructors, and make necessary changes.

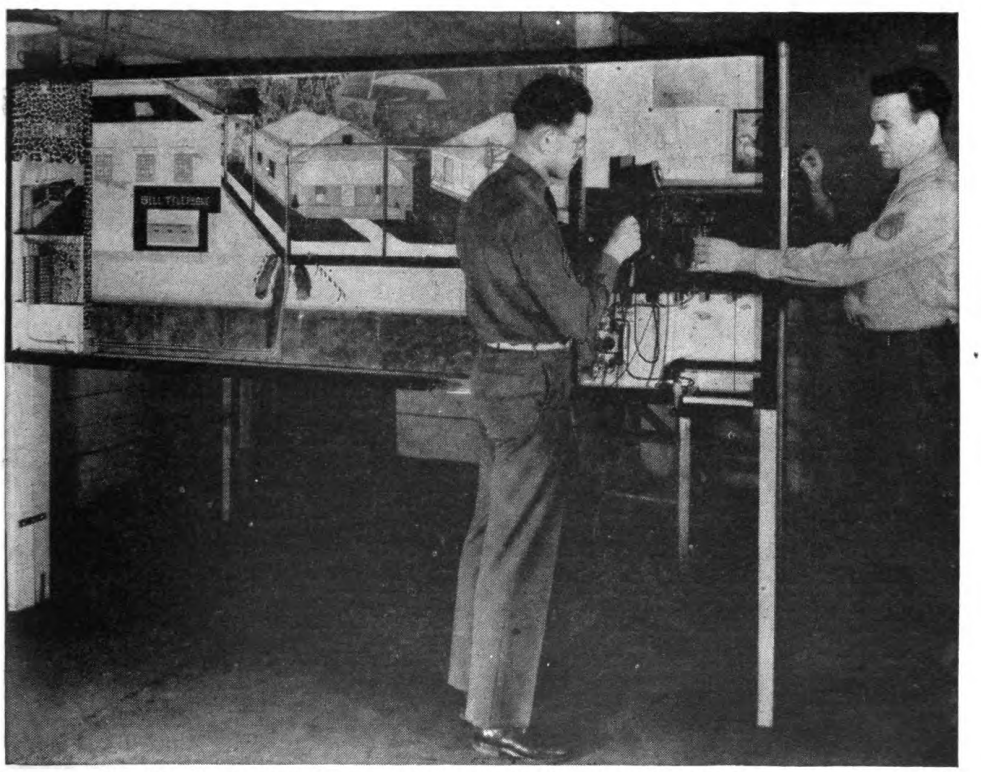


FIGURE 53.—Telephone maintenance performance test requiring student to locate trouble which has been placed on line by instructor.

78. How to administer and score performance tests (see pars. 95 and 96).—*a.* Determine accurate standards of workmanship and performance *before* giving the test.

b. Make a check list of specific points involved in the task and, if necessary, provide examples of the different degrees of excellence of the finished job.

c. Have a competent observer judge the student's performance using the check list of specific points as a guide.

d. After the student has completed the test, evaluate his under-

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standing of the job by questioning him on the proper procedures, principles, reasons for the various steps, and expected results of the operations or procedures.

e. Where needed, have on hand appropriate measuring instruments such as micrometers, gages, rulers, templates, etc.

f. Assign an appropriate grade based on the quality of the student's performance and his understanding of the operations.

79. Advantages of performance tests.—*a.* A performance test is the most direct means of finding out whether a man can actually do a job and do it well. Written tests, no matter how carefully or cleverly constructed, may fail in this respect. For example, a student may pass a written test on how to reline brakes, answer all the questions asked, and yet commit several errors while actually carrying out the task.

b. Performance tests reveal, better than any other type of test, specific difficulties a student encounters when doing a job. In a situation where the student is required to service, repair, shape, assemble, or disassemble something, a performance test is practically the only way of revealing whether the student—

(1) Handles his tools efficiently.

(2) Observes all necessary safety precautions so as not to endanger himself or his fellow workers.

(3) Carries out the operations in the correct order or sequence.

(4) Becomes emotionally upset when unable to do any part of the job.

(5) Fails to care for his tools properly when he has finished work.

80. Limitations of performance tests.—The disadvantages of performance tests are not so much weaknesses as they are limitations imposed by outside circumstances. The assistance of experienced personnel in the test section can be used in overcoming some of these limitations.

a. They are difficult to set up properly.

b. They are more difficult to administer than written tests since they often require that tools and special equipment be made available to the student.

c. Much of the instructor's or assistant instructor's time is required in checking student performance.

d. Wherever the performance is of a detailed and precise nature necessitating close observation, an assistant instructor is able to watch only one student at a time. In large classes such performance tests would be clearly out of the question. Oral questioning or written tests which attempt to get at performance indirectly would have to be substituted.

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SECTION IV

WRITTEN TESTS

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81. Introduction.—*a.* Written questions can be classified into two main forms, *essay* and *objective* (*new-type*) questions.

(1) The essay question consists of a broad question or statement followed by directions to "discuss" or "explain" the problem. Such a question forces the student to recall and logically express all that he knows about the question.

(2) The so-called *new-type* or *objective* questions are characterized chiefly by two things: first, they require the student to do little or no writing—he does not "express" himself at length; second, they enable the instructor to score answers quickly and confidently, since they largely eliminate errors of judgment in determining whether the answer is right or wrong. It is this feature of the new-type question that gives it the name *objective*. Illustrative objective test items are given in paragraphs 83 to 89, inclusive.

b. Each type has its *specific uses*, and these should be clearly recognized and taken into consideration by the instructor when he constructs his tests. (See pars. 82 to 90, incl.)

c. The phrasing of a written question, whether essay or objective, should leave no doubt in the student's mind as to what is required.

(1) Vague or ambiguous questions should be eliminated before a test is given. A good way to do this is to try them out on other instructors or on students and see whether the problem as stated is clear.

(2) Test items should not emphasize mere rote memory. Catechismal instruction which stresses the blind, meaningless recall of passages verbatim may lead to absurd results as shown by the following questions:

(*a*) "What should be done whenever possible?" The answer was, "Troops should be fed fresh beef whenever possible."

(*b*) "What must the rifle be cleaned with?" This question had one, and only one, answer, "Great care."

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82. Essay.—In the essay type test item, the student is required to make a comparison, write a description, or explain certain points over which instruction has been given.

a. Uses, advantages, and limitations.—(1) The essay item can be used effectively to measure the student's ability to organize and express thoughts.

(2) It can be used to measure complete understanding of certain points.

(3) Its greatest disadvantage lies in the fact that its scoring becomes subject to the instructor's interest, range of knowledge, etc.

(4) Response to the essay item requires much student time.

(5) Scoring the item requires much more time than required for other types.

(6) Only a relatively few points can be covered by essay items. A poor sampling of the subject matter may result.

(7) It provides the student an opportunity to "bluff."

(8) Men who know subject matter well but are not skilled in writing may be penalized unfairly on an essay examination.

b. Construction.—(1) Call for specific answers. Word the item in such a manner as to provide the student with an outline that he can follow in formulating his response.

(2) State the item in a simple, direct manner.

(3) Allow one point for each significant idea or fact expected in the response.

(4) Design the essay item to require the student to "compare," "explain why," "give a reason," "describe," or "explain how" rather than to "name," "list," or "enumerate."

c. Scoring.—It is in scoring the essay type test item that great difficulty is experienced. The following points should be observed to insure maximum objectivity:

(1) Write out the answer expected for each item. Include every point that is to be accepted.

(2) Score one essay item on all the test papers before proceeding to the next.

(3) Give value to an item by allowing one unit of credit for each point covered in the answer.

(4) Conceal the students' names or use numbers to identify test papers. This is particularly important in cases where instructors have an opportunity to become personally acquainted with students.

83. True-false.—This kind of test item consists of a simple statement that may be either true or false. The student is required to indicate whether or not the statement is true. Considerable guessing is possible. Several means of indicating responses can be used: "Yes" or

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"No," "T" or "F," "True" or "False," and "+" or "0." For a description of the semi-oral method of conducting a true-false quiz see paragraph 7*d*, FM 21–7.

a. Example (true-false).

Directions: Some of the following statements are true and some are false. If the statement is true, place a (+) plus in the blank space at the left. If the statement is false, place a (0) zero in the space. The first item is answered as an example.

0 (1) In testing for voltage on the plate of a receiver tube, an ammeter should be connected from the plate to the ground.

_____ (2) An *urgent* radio message may be transmitted in *clear text* at the discretion of the radio operator.

b. Uses, advantages, and limitations.—(1) It can be used to sample effectively wide ranges of subject matter.

(2) It can be scored readily in an objective manner.

(3) It can range from a factual question to thought questions that require reasoning.

(4) It can be designed to include application of things learned.

(5) Difficulty is encountered in constructing items that are either completely true or false without making the correct response obvious.

(6) It encourages guessing. Approximately 50 percent of the items can be marked correctly without any knowledge of the subject matter involved.

c. Points to be observed in constructing true-false test item.—

(1) Make approximately half the items true and half false.

(2) Do not make one part of a statement true and the other part false.

(3) Have true and false answers distributed at random throughout the test.

(4) Do not make the true statements consistently longer than the false statements.

(5) In testing for understanding of a principle, avoid using unnecessary technical terms and trivial details.

(6) Avoid double negatives, involved statements, and obvious or trivial items.

(7) Make application of things learned the point of as many of the items as possible.

(8) Avoid using such words as "all," "none," "never," "always," "generally," or "only" unless they are the basis for the exact discrimination required of the student. Experience has shown that true-false questions containing the words "all," "only," "never," and "always" are usually false, while questions containing "none," and "generally"

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are usually true. Test-wise students can guess the answers to such items.

(9) Where possible, make the crucial elements come near the end of the statement.

(10) Test the student on the important points by several items, each of which is stated differently or emphasizes different aspects.

(11) If used to measure *achievement*, include at least fifty items in the test.

84. Cluster true-false.—The cluster true-false item consists of an incomplete statement followed by several phrases or clauses, any one of which will complete the statement. The student is required to indicate by "+" and "0," etc., those phrases or clauses that make the statement true or false. This type has not been used extensively but is generally more effective than the simple true-false item.

a. Example (cluster true-false).

Directions: The incomplete numbered statements below are followed by several items, each of which will complete the statement. Place a plus (+) in the blank space to the left of each item that makes a true statement. Place a zero (0) in the blank space to the left of each item that makes a false statement. The first item is answered as an example.

The closing spring of the 75-mm gun:

__0__ is compressed during recoil.
_____ closes the breech when a new round is inserted.
_____ is removed from the gun in field disassembly.
_____ transmits force through the operating crank to the splined shaft to the breachblock in closing the breech.

b. Uses, advantages, and limitations.—The cluster true-false item possesses all the advantages and some of the disadvantages of the plain true-false. In addition—

(1) It can be used to check several points with respect to a particular concept, principle, or mechanical unit, and so on.

(2) It requires less space per point.

(3) It tends to reveal more closely the student's complete understanding of the operation or principle.

(4) It has high reliability and discriminating value.

c. Points to be observed in constructing cluster true-false items (see also par. 83*c*).—(1) List at least five phrases, words, or clauses after each incomplete statement. Many more may be listed.

(2) Make all the responses plausible.

(3) Make sure that each phrase or clause listed will make a complete statement.

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85. Multiple choice.—This type of item consists of an incomplete statement followed by several phrases, words, or clauses from which the student must select the one that will best complete the statement in accordance with directions given. The simplest kind of multiple choice item requires the student to identify the one correct response listed among several that are wrong.

a. Examples (multiple choice—one right answer).

Directions: The incomplete statement given below is followed by several phrases. From these phrases choose the one that, when added to the incomplete statement, best completes the statement. Place the letter of the one best word or phrase (A, B, C, D, or E) in the blank space at the left of the statement. The first item is answered as an example.

C (1) The correct firing order of a seven-cylinder radial engine is:

A. 1–5–2–6–3–4–7
B. 1–3–5–7–4–2–6
C. 1–3–5–7–2–4–6
D. 1–2–3–4–5–6–7
E. 2–4–6–1–3–7–5

_____ (2) You are the leader of a light tank platoon acting as the advance party of an advance guard. If an enemy self-propelled, antitank gun opened fire from a position 400 yards to your front, you would give an order to—

A. Halt the advance party and call for support.
B. Attack in wedge formation.
C. Establish a base of fire with one section and maneuver to destroy the gun with the remainder of the platoon.
D. Assault the gun position with the platoon in line.
E. Seek defilated position and destroy the enemy gun by fire.

b. Uses, advantages, and limitations.—(1) The multiple choice item can be designed to measure effectively the student's ability to form judgments and make application of things learned.

(2) It can be used to measure what a student can recognize, which represents a much wider field than what a student can recall.

(3) It can be varied to suit many kinds of subject matter and to measure various types of achievement—command of fundamentals, formation of judgments, and so on.

(4) It can be made entirely objective.

(5) There is danger of including more than one response that can be marked correctly.

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c. Points to be observed in constructing multiple choice test item (see pars. 82*c* and 83*c*).—(1) Include at least four or five, but not more than six, possible responses in each item. Less than four choices increases the possibility of guessing the correct response.

(2) Include no responses that are obviously wrong. If any response is obviously wrong, it should be left out. To have testing or discriminating value, all answers must be worded in such a manner that the student must know the subject matter in question in order to select the correct one.

(3) Have the alternate responses or choices come at the end, rather than within the statement.

(4) Avoid clues to the correct response. Example of such clues are exact verbal phrases taken from the text, and shifts in grammatical construction for the correct response. (The correct response might be in the plural; all the incorrect, in the singular.)

(5) Do not make the correct response consistently longer or consistently shorter than the incorrect responses. Alternative responses should be approximately the same length.

86. Completion.—The completion type of test item requires the student to recall and supply one or more key words that have been omitted from statements. The words, when inserted in the appropriate blanks, make the statements complete, meaningful, and true. The statements may be isolated and more or less unrelated, or they may be combined to form short paragraphs that carry a continuous line of thought.

a. Examples (simple completion).

Directions: An incomplete statement is given below. The blank space, or spaces, in the statement indicate the omission of a word or phrase needed to make the statement true. Complete the meaning of the statement by writing the correct word or phrase in the blank at the left, numbered to correspond with the blank in the statement. The first item is answered correctly.

60 (1) The light tank should be stopped if the oil gage registers less than (1).

_____ (2) The abbreviation used to designate the radio station controlling traffic in a cammunication net is (2).

b. Uses, advantages, and limitations.—(1) The simple completion item can be used to test students' abilities to recall specific facts; it demands accurate information.

(2) It can be used to sample a wide range of subject matter.

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(3) The paragraph forms can be used to test continuous thought along a certain line.

(4) Well constructed completion items have a high reliability.

(5) Completion items have high discriminating value.

(6) They are relatively difficult to construct.

(7) They are difficult to make entirely objective.

(8) Too many words omitted confuse students; too few make answers obvious.

c. Points to be observed in constructing completion type test items.—(1) Omit no more than three words or short phrases in a given sentence. One blank in each statement is preferable.

(2) Design each statement in such a manner that it will remain *incomplete* until the correct response is inserted.

(3) Omit only key words. Make sure the item is not testing for some insignificant or trivial idea or word.

(4) There must be only *one* correct response for each blank.

(5) Do not copy statements directly from text books to make a completion item.

(6) Never omit verbs or the first two or three words in the sentence. Place the blanks near the end or at least past the center of the sentence.

87. Listing or enumeration.—The listing or enumeration type of test item requires the student to supply a list of terms, rules, factors, and so on, that have been emphasized in a given course. The student may or may not be required to list the things in a particular order.

a. Example (listing or enumeration).

Directions: Follow carefully the directions given with each question.

Give six mechanical conditions which cause overheating in the motorcycle engine.

(*a*)	_____	(*d*)	_____
(*b*)	_____	(*e*)	_____
(*c*)	_____	(*f*)	_____

b. Uses, advantages, and limitations.—(1) It can be used to measure the recall of highly specific points of information or of the general phases, or steps, of a situation or operation.

(2) It allows a degree of freedom of expression.

(3) It minimizes the problem of guessing the correct response.

(4) It can be made objective, highly reliable, and valid.

(5) Its use may place too much emphasis upon the memorizing of facts and details.

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(6) It does not measure readily the individual's ability to use or interpret the information taught.

c. Points to be observed in constructing, listing, or enumeration test items.—(1) Design the enumeration item so that it will call for specific information or procedures.

(2) Each thing to be listed should involve only a few words. The student should not be required to list long involved statements, because scoring these becomes difficult.

(3) One question should rarely call for more than six or eight things to be listed.

(4) Do not try to use this item if the student can choose from a great variety of possible answers to supply the responses. That is, do not call for five things out of a list of fifteen taught in the course.

88. Matching.—*a.* The matching type of test item includes two or more lists or columns of related words, phrases, clauses, or symbols, and so on. The student is required to match each item in one list with the item in the other list(s) to which it is most closely related. These items can be set up in the form of a table in which the student is required to indicate the correct answer by placing a check mark in the proper square. These exercises may be used to require the student to match—

(1) Terms or words with their definitions.
(2) Characteristics with the mechanical units to which they apply.
(3) Short questions with their answers.
(4) Symbols with their proper names.
(5) Descriptive phrases with other phrases.
(6) Causes with effects.
(7) Principles with situations in which the principles apply.
(8) Parts or mechanical units with their proper names.
(9) Parts with the unit to which they belong.

b. Examples (matching).

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(1) *Directions (tabular form): In the following table, indicate each* authorized *pay allotment* by placing a (X) in the proper *squares.*

	For support of a dependent brother	For support of a good friend	For payment of life insurance premium of the allotter	For payment of life insurance premium of the allotter's wife	For payment of a debt on the installment plan	For War Bonds	To a bank
An enlisted man may make an allotment—							
An officer may make an allotment—							

(2) *Directions (matching lists)*: The phrases or terms in columns I and II below refer to the .50 caliber, heavy barrel machine gun. Write on the blank at the left of each item in column I the letter of the *one* item in column II that *best* matches the item in column I. Each item in column II may be used more than once.

Example: The cocking lever prevents premature firing. Therefore "E" is placed in the space to the left of "prevents premature firing."

COLUMN I	COLUMN II
E (x) Prevents premature firing	A. Barrel extension rearward
_____ (1) Prevents double feeding	B. Belt feed pawl arm
_____ (2) Prevents tripping accelerator	C. Bolt forward
_____ (3) Results in sluggish operation	D. Bolt latch
_____ (4) Has a side plate trigger	E. Cocking lever
_____ (5) All recoiling parts locked	F. Cover
_____ (6) Taken to reduce stoppages	G. Elevate bolt
_____ (7) Has spade grips	H. Fixed gun
_____ (8) Mates with cross groove of piston rod	I. Flexible gun
_____ (9) Retards overheating	J. Head space too tight
_____ (10) Oil buffer spring compressed	K. Heavy barrel
	L. Hook on barrel extension shank
	M. Immediate action

c. Uses, advantages, and limitations.—(1) The students' ability to recognize relationships and make associations can be tested readily.

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(2) A large number of responses can be obtained in a small space with one set of directions.

(3) It can be completed quickly by the student and scored quickly by the instructor.

(4) The possibility of guessing the correct responses is slight.

(5) It tends to be highly reliable and discriminating.

(6) Since the phrases or clauses must necessarily be short, the matching exercise provides a poor measure of complete understandings and interpretations of information or principles taught.

(7) It is likely to contain irrelevant clues to the correct response. Difficulty is encountered in eliminating such clues.

d. Points to be observed in constructing matching items.—(1) Require the student to make at least five and not more than twelve responses in completing each matching exercise.

(2) Include at least three extra terms from which responses must be chosen. This tends to reduce the possibility of guessing or answering by eliminating responses.

(3) Only closely related materials should be included in any set of items so that several plausible responses are given for each item.

(4) In matching the parts of the item the student may use each part more than once. Whenever this is to be done, however, the directions should clearly state the fact.

(5) In setting up the test, make sure that all of a given matching exercise appears on one page.

(6) Make the directions specific. State in the directions the area of instruction to which the items listed apply.

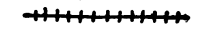
89. Identification.—The identification type test item requires the student to recall and indicate the proper names of parts, mechanical units, or symbols, and so on. Except for the difference in recall required, it is similar to the matching item as used to measure the students' ability to associate names with symbols or parts. The identification item is the more difficult of the two for the student.

a. Example (identification).

Directions: In the blank to the left of the symbols shown below, write in the names of the object represented by each symbol.

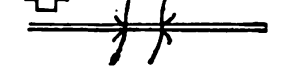
_____ 1. 

_____ 2. 

_____ 3. 

_____ 4. 

_____ 5. 

_____ 6. 

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b. Uses, advantages, and limitations.—The identification item can be substituted for the matching when it is desired to have the student recall outright the proper names.

c. Points to be observed in constructing identification test items.—

(1) Make sketches clear and sufficiently large.

(2) Make sure that lines indicating parts to be named terminate at proper places.

(3) Wherever practical, display the actual parts or units instead of using sketches.

(4) If the actual parts or units are to be displayed, place the identification items at either the beginning or end of the test.

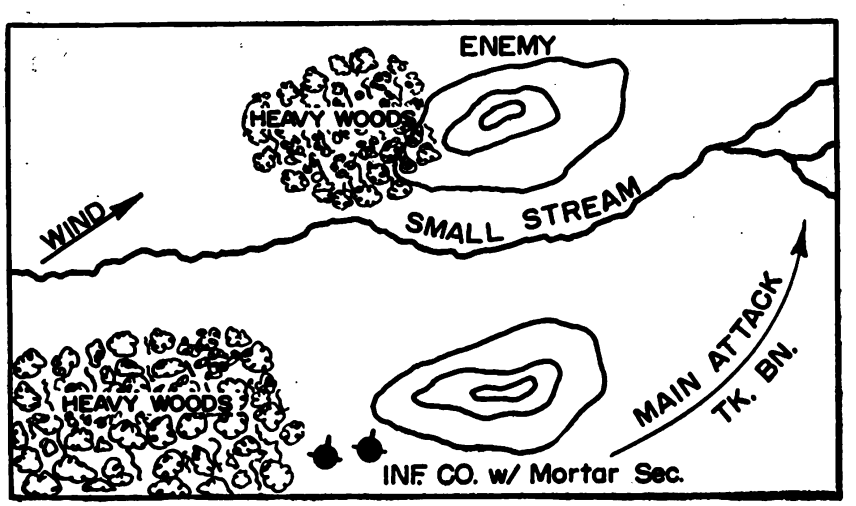
90. Situation.—*a. General.*—The situation type test item involves the statement of a problem, the description of a situation, or the presentation of a demonstration (see the "County Fair" in TF 7-295) to which the student is required to respond. It may be designed in such a manner as to require the student to indicate his response by making a simple sketch, by completing a sketch included in the test, by completing an outline, by listing errors made, or by writing his analysis in the space provided.

b. Examples (situation).

(1) *Situation:* The sketch below shows the position of friendly and enemy troops. Study the sketch carefully.

Two chemical agents might be used to support the main attack and protect the supporting infantry.

Requirement: Indicate on the sketch the names of the chemical agents and the points at which they are to be employed.



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(2) *Situation:* A medium tank platoon and a light tank platoon are the assault platoons in the first wave of a first echelon of attack.

Requirement: State the differences, if any, between the tactics used by the medium platoon and the light platoon attacking in this situation.

_____

_____

_____

_____

c. Uses, advantages, and limitations.—(1) It can be used effectively to measure the students' ability to make application of things learned.



FIGURE 54.—Problem in dead-reckoning procedures.

(2) It can be varied or adapted to various kinds of subject matter.

(3) It is difficult to make objective.

(4) It is difficult to construct and score.

d. Points to be observed in constructing situation items.—(1) Construct the item in such a manner as to require the student to reason and to make use of previous learning in solving the problem or situation.

(2) State the problem or describe the situation clearly and concisely. Use sketches wherever possible. Make the item specific.

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(3) Avoid having the solution of one problem based on the response to another. If an earlier answer is wrong, answers to later questions are likely to be wrong.

(4) Methods of indicating responses will vary. Include separate directions for recording the response in the description of each situation or the statement of each problem.

(5) Number each of the responses in the solution to a given problem either on the test or on the scoring sheet, and allow each response to count one point.

SECTION V

PROBLEMS AND REPORTS

	Paragraph
Introduction	91
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Cautions to be observed	93
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91. Introduction.—Marked problems and reports, such as those commonly assigned in tactical courses, are really tests done outside of class time. They are, therefore, properly considered as measuring devices.

92. Advantages of problems and reports.—Problems and reports have several important advantages from the measurement point of view:

a. They test the student's ability to organize, coordinate, and relate ideas.—In his writing, the student shows whether he is capable of sifting the significant from the insignificant, whether he can subordinate one to the other, and whether he can present facts logically and understandably. His attention to orderly development and his skill in planning are demonstrated to a degree not possible in other written test techniques.

b. They afford an opportunity for the student to display originality and initiative in his thinking.—There are often several ways to solve a problem or to write a report. Occasionally students submit solutions differing from, but as good as, "approved" solutions; some student answers have, in fact, been used as approved solutions for future assignments. Marked problems can become excellent training devices for developing originality and initiative, since they call upon the student to appraise a situation, weigh the important factors and considerations involved, and come to a decision on his own responsibility. In actual warfare, men must decide and act without benefit of books or instructors. Practice in solving problems is advanced training for the kind of ability that will be needed by leaders in responsible positions.

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c. They complement objective test techniques.—Written problems and reports reveal a side of the student largely untapped by other pencil-and-paper testing methods. As has been pointed out, objective tests serve a variety of measuring functions, but they do not give the instructor much insight into the student's ability to organize materials and to express himself clearly and concisely, nor do they indicate the basic attitudes that will influence his decisions. Written problems or reports, along with essay questions, supply this information. Thus they are important devices for finding out *what* a man thinks, how he can organize his thoughts, why he has come to a certain decision, and how effectively he can communicate his point of view to others.

93. Cautions to be observed.—*a. Problems and reports should be reasonable in scope.*—The instructor should not expect his students to work out an elaborate tactical problem or write a long report overnight. He should plan his assignments with reference to the working time available. Unless this is done, problems and reports become tests of endurance, and the primary aim—measurement of a man's ability to think and to organize his thoughts logically—will be lost. For this reason, assignments should be made well in advance of the required date of submittal.

b. The directions should be clear and unambiguous.—The student should know exactly what is expected of him. The situation, scope, and approximate length of the report or problem should be indicated. Reading references and materials necessary for the solution of the problem or the completion of the report should be listed.

94. Grading problems and reports.—*a. A list of desired basic points should be prepared.*—As was the case with the essay examination, grading is made easier and more objective if a list of essential points or principles is drawn up before the problem or report is assigned. Care should be taken that all important items are included.

b. The list should be checked by competent judges.—Instructors or other well-qualified persons should check the list for completeness. They should be encouraged to suggest alternate ways of stating the situations and solving the problems.

c. Weights should be assigned to each point.—Scoring and grading will be facilitated if a uniform number of credits is given to each important point adequately developed by the student, and no credit to a point omitted or inadequately handled.

Credit should also be given for any important points developed by the student which bear on the problem at hand but which may have been overlooked by the instructor in preparing his test.

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d. The instructor should have all approved solutions at hand.—There may be several ways of solving a problem. It is the instructor's responsibility to be familiar with all of them or at least to have them on hand to compare with the student's solution. He should avoid penalizing a man simply because he did not follow an approved model.

e. The instructor should read several reports or problems before marking any.—This will give the instructor some idea of the range of

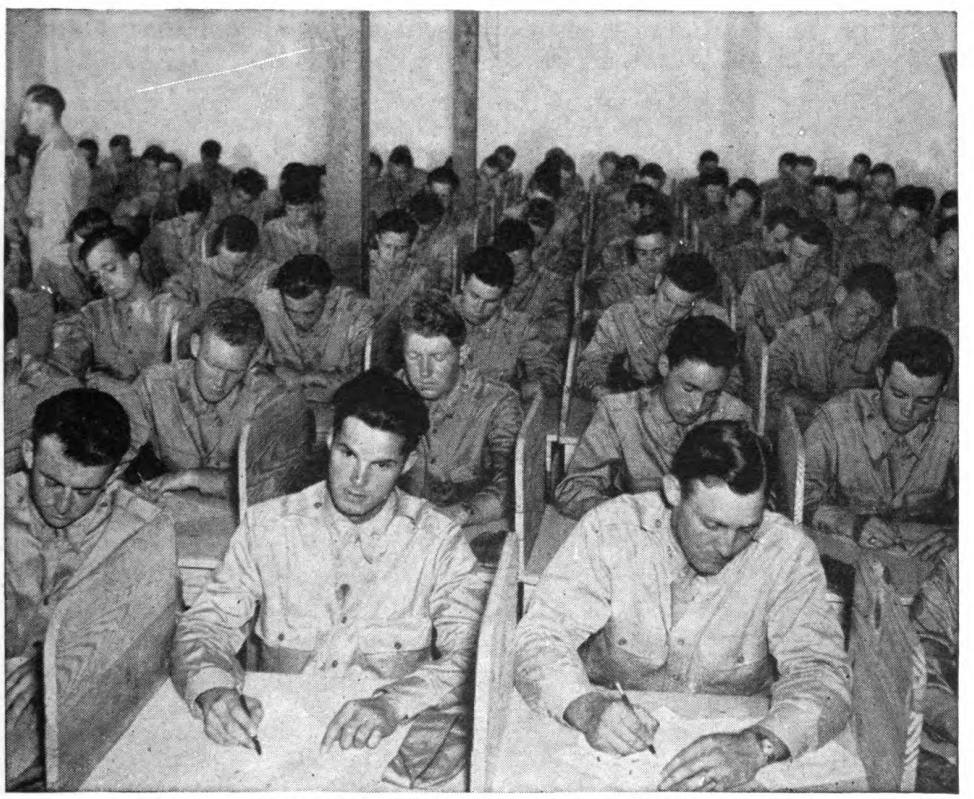


FIGURE 55.—Students taking written test.

ability developed by the class and help to establish a comparative basis for assigning grades.

SECTION VI

ADMINISTRATION OF TESTS

Paragraph
Need for careful administration 95
Procedures in administering tests 96

95. Need for careful administration.—*a.* A poorly administered test is worse than no test. The results of improperly administered as well as poorly constructed tests give the instructor an incor-

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rect impression of his students' mastery of the materials taught. The results of this misconception may not be apparent until it is too late. The only way to prevent this error is to check students frequently with carefully constructed tests properly administered and interpreted.

b. In order that a test may measure mastery of the materials taught, the students must be given every opportunity to do their best. If a man gets a low score because he misunderstood the instructions, or was fatigued or emotionally upset, his score is not a true indication of his ability. Likewise, a high score resulting from cheating or from the improper help of the instructor or his assistants will be a false indication of his ability.

96. Procedures in administering tests.—*a. Procedures.*—The instructor who is giving any test must—

(1) Have all testing materials ready.
(2) Train any assistants that will be needed.
(3) Provide the best possible testing conditions.
(4) Give the students a good start.
(5) Conduct the test properly.

b. Testing materials.—An instructor who has prepared the items for the examination or the problems to be solved must be sure that enough test blanks, directions, check lists, operation sheets, tools, pencils, scratch paper, or any other material required will be on hand in the classroom at least 15 minutes before the test is scheduled to start. The testing materials may be distributed to the men either as they enter the room or after they are ready to start. The instructor may delegate the duty to one of his students, but he is responsible for seeing that the materials are ready for use.

c. Testing assistants.—For the proper administration of performance tests, for those requiring considerable time, or for any test being given to a large group of students, the instructor should be provided with assistants.

(1) There should be one assistant for every 25 men tested on a written examination which is covering materials of a job assignment, subject, or course. A performance test will usually require an assistant for every one or two men.

(2) The smoothness of testing procedure will depend upon the efficiency of the assistants. The instructor should work out a convenient schedule for the assistants to follow in distributing and collecting test materials, in seating and dismissing the students, in checking their work, supervising the conduct of the test, and in giving them any help that is proper.

(3) The instructor should go over the examination carefully with the assistants and indicate to them the points at which he may expect

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the students to have difficulty, the amount and kind of help they may give the students, and their exact function and position in the classroom.

d. Testing conditions.—Students are not able to do their best in a dark, noisy, or crowded classroom. The instructor should eliminate all interest-destroying factors (see par. 52), arrange the mechanical aspects of the room in the most expedient way (see pars. 22 and 23), and place the seats, or working lay-outs, so that each man will have ample working space and be far enough from his neighbor that there is no temptation to see the work of any one else. Men should be mentally and physically rested before they are given any crucial examination. No one in a state of fatigue, such as might be brought on by a long march or a sleepless night, can do justice to an examination.

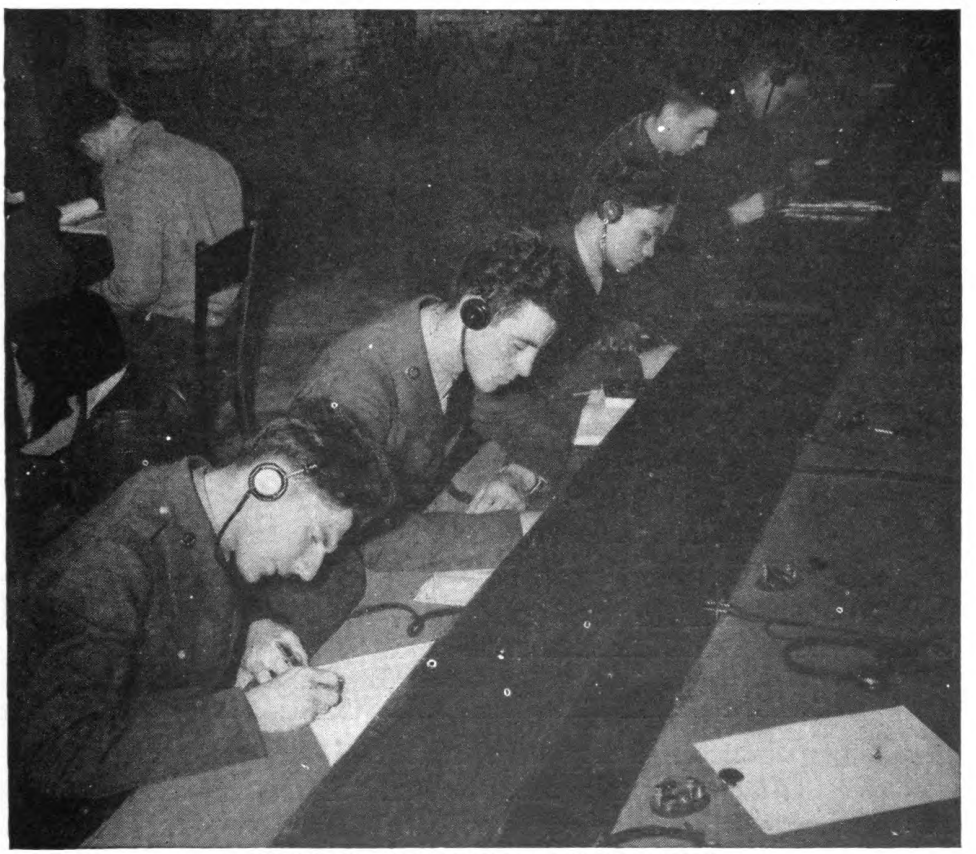


FIGURE 56.—Radio trainees taking code test.

e. Starting the test.—A test, like any other phase of instruction, should be started in a businesslike manner. The instructor is responsible, first of all, for putting the men at their ease. In his directions explaining the test situation, he should encourage the men to do their best.

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(1) The instructor must make certain that the men understand the test directions. General instructions for tests of any length should be written out. These directions should be read clearly and unhurriedly to the men who should be encouraged to ask questions at the end of the reading in order to clear up any possible misunderstandings.

(2) Before starting the test, the instructor should indicate to the students the amount or kind of help they can secure and the materials that are to be used. They should be told whether a single over-all time limit, time limits on separate items or sections, or credit for speed of work will be used. If a test is being administered with no time limit, the students should be told that they will have as much time as they need.

f. Conducting the test.—In order that a test may give the best possible indication of the ability of each man in the class, the conditions under which the test is conducted should affect each man alike.

(1) Order in the classroom and on the job must be maintained. No student should be allowed to interrupt another student nor create any disturbance.

(2) Some tests are timed. They must be timed accurately. For most purposes this is best done by recording in advance the exact time at which the men will finish.

(3) At the completion of the examination, all materials are to be collected, any equipment used placed in proper storage order, faulty test papers destroyed, and the test papers made ready for scoring.

Section VII

OBSERVATION OF STUDENT BEHAVIOR

	Paragraph
Introduction	97
Check lists	98
Rating forms	99
Interviews	100

97. Introduction.—Many aspects of student performance and conduct essential to military success cannot be measured by written tests. Such qualities, as leadership, adaptability, interest, work habits, and the like may be evaluated by observing students in a variety of military situations. This observation, however, must be controlled and directed if it is to have maximum value in the evaluation program.

a. Purposes.—Controlled methods of observing students—

(1) Provide a fairer evaluation of conduct by bringing together the judgments of observers who have varied experience and backgrounds.

(2) Reduce the fallibility of human judgment.

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(3) Lessen the possibility of errors due to overconfidence of any one observer.

(4) Make more nearly comparable the judgments of different observers.

b. Types of controlled observation.—Supervisors, reviewing boards, and instructors are all called upon to make judgments based on their observations. These judgments can be made more objective, comprehensive, valid, and meaningful by the use of such aids to observation as—

(1) Check lists.

(2) Rating forms.

(3) Directed interviews.

c. General procedures.—The observer should—

(1) Select phases of conduct that provide evidence of the quality being judged. If, for example, the problem is to evaluate students on leadership, the observers must see the students in situations that permit them to demonstrate their leadership ability, such as giving commands, directing activities of a small unit, and making and executing decisions. Similarly, to judge a student's ability as an instructor, he must be observed as he handles classes under varying conditions.

(2) Make the observations comprehensive. He should avoid evaluating personnel on the basis of a few characteristics. All important phases must be considered, and there is only one way to do this: prepare a careful list of the important points.

(3) Define the points to be observed. Each point must be clearly and accurately defined in terms of student behavior so that there will be no misunderstandings or ambiguities. Everyone concerned in the evaluation must think of the factors in the same way.

(4) Define the standards of performance or conduct. It is not enough simply to look over a situation or watch students at work. The observer must know exactly what standards are to be expected as the student actually does the job. Work habits must be evaluated in terms of field use; personal characteristics, in terms of present and future use. These standards should be reviewed by several officers with varied backgrounds.

(5) Observe accurately and impartially. An observer must be alert to all that is happening. He must avoid letting his opinions or biases influence his judgments; fatigue or emotional upsets should not enter the evaluation.

(6) Make an accurate record immediately. Memory is too fleeting for an observer to trust in making important judgments. A complete record of the observation, notes on a check list, or ratings made at the

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time or immediately after the observation are necessary to make the judgment valid.

(7) Combine judgments of several competent observers. Repeated observation increases the probability that all important factors will be considered.

(8) Use standardized forms when available. A standard list of questions to be used in interviews, a check list for observation of performance, or a rating scale based on the consensus of opinion of competent judges insures that attention will be paid to the important phases.

98. Check lists.—A check list is a device which presents in a convenient form a series of statements to be used in evaluating certain characteristics of a situation.

a. Uses.—A check list can be used in—

(1) Evaluating a student's work on a performance test. (See fig. 52.)

(2) Observing an instructional situation.

(3) Assigning numerical values to observations.

(4) Indicating the presence or absence of personal characteristics.

b. Technique.—(1) *Construction.*—(*a*) Select the exact phase of conduct or of the situation to be observed or judged.

(*b*) Define specifically by an unambiguous statement each feature to be judged.

(*c*) Provide space for a check mark, for encircling "Yes," "No," or for indicating the presence or absence of the characteristics.

(*d*) Place together in the list all items relating to one phase.

(*e*) Provide for both detailed and summary judgments.

(2) *Uses.*—(*a*) Check those statements relating to operations or conduct while the performance is being carried on.

(*b*) Check the result of the work, its quality, conformance to accepted standards, etc., upon the completion of the job.

(*c*) Allow one grade point for each correct step of procedure, the presence of each desirable work habit, or for each acceptable characteristic of the finished product.

(*d*) Interpret the scores determined by adding the number of points allowed as explained in paragraphs 102, 103, and 104.

c. Advantages and limitations.—(1) Comparable judgments over a period of time on large numbers of personnel can be secured.

(2) The check list calls specific attention to the important points and indicates exactly the procedures that should be followed.

(3) It is easy to use and to score.

(4) It provides objective evidence of the efficiency of instruction.

(5) If the check list has not been properly set up to include all

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important factors, the observation may omit judgment on important aspects.

(6) The check list does not indicate the relative importance of the steps of the operation or of the characteristics observed.

(7) The results of several observers should be combined for the most satisfactory evaluations.

(8) The results of the check list provide evidence of the ability of the observer as well as of the man checked.

99. Rating forms.—Ratings are used by the Army in officers' efficiency reports, selection of noncommissioned officers, and evaluating the performance of officer candidates. Rating forms or scales may require the observer to use a master reference scale, assign rank orders, mark each factor on a separate scale (either graphic or verbal), or use the man-to-man rating form.

a. Uses.—A rating form can be used—

(1) When the observation is of a few factors too broad to be defined adequately by a check list. (See fig. 61.)

(2) When the factors to be considered are too numerous to be put in a check list. (See fig. 62.)

(3) When analytical judgments are required.

b. Technique.—(1) *Construction.*—(*a*) By means of a preliminary observation, select the phases of conduct to be rated.

(*b*) In such a way that degrees of success may be determined, define clearly and concisely the feature to be rated.

(*c*) Use about five steps of attainment or success.

(*d*) Limit the number of factors to be rated at one time.

(*e*) Have the set of factors listed on one side of a sheet if possible.

(*f*) Set up the ratings so that numerical scale values are obtained.

(2) *Uses.*—(*a*) An observer should practice using the rating scale and check his results with those of other observers so that comparable judgments will be obtained.

(*b*) All steps of the rating scale, such as superior to unsatisfactory, must be used if they are deserved.

(*c*) If several men in a group are being rated at one time, rate each on one quality or characteristic before rating any on a second characteristic.

(*d*) Observe the situation or the performance carefully for a period of time before making a judgment.

c. Advantages and limitations.—(1) Ratings are aids in administering and in supervising instruction.

(2) They provide a satisfactory means of evaluating personal characteristics important in military situations.

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(3) Training of the rater is required for comparability of judgments.

(4) Sufficient time and opportunities must be provided to make adequate observations which are valid.

(5) There is a tendency for the general impression made upon a rater to affect all the specific ratings that he makes.

100. Interviews.—Interviews are used in counseling personnel, in conducting conferences with instructors, in evaluating officer candidates, and in providing an opportunity for all personnel to present their problems to their company commander.

a. Uses.—Supervisors, instructors, and commanders will use directed interviews to—

(1) Discover facts or information about personnel.

(2) Determine their attitudes, their opinions, and their reactions in a new situation.

(3) Motivate men by indicating a personal interest and by providing an opportunity to reward them for their achievements.

(4) Improve training and achievement through conferences with students and instructors.

b. Technique.—An interview must be planned. An officer to whom a soldier is coming will face a situation different from that of the supervisor who is calling in his instructors for a conference on their work. The purpose of an interview will influence markedly the technique to be used. In general, however, the interviewer should—

(1) Plan the exact points of the discussion ahead of time and prepare a schedule of the points to be discussed.

(2) Put man being interviewed at ease. The purpose of the interview should be clarified, and the cooperation of the man being interviewed must be secured.

(3) Prepare specific, unambiguous questions on the important points to keep the discussion on the topic. Only one question at a time should be considered.

(4) Hold the interview in a quiet place where there will be no interruptions.

(5) Observe the man's reactions as well as what is said—his tone of voice, his mannerisms, his expressions and attitudes, etc.

(6) Give the man being interviewed an opportunity to tell his story. The interviewer should then summarize it briefly to be sure the picture is clear.

(7) Keep a record of the interview. Some notes can be taken during the interview, while others will be made immediately after.

(8) Check the results of the interview against all available data. The company commander will have a record of the man's training

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achievements and conduct record, and these should be checked against the results of the interview.

c. Advantages and limitations.—(1) It provides an opportunity for a supervisor or a commander to know the opinions and feelings of his men, and to show that he is interested in them.

(2) It allows the person to respond freely and secures information quickly. Sources of difficulty, courses of action, and other such leads can be found.

(3) There is a possibility of bluffing in the interview.

(4) There is danger of a general impression unduly influencing the student's reaction or the interviewer's judgment. A visual impression or a hasty word may change the course of the entire interview.

(5) An interviewer who is securing information must be trained to get specific points without influencing answers.

(6) The interviewer must command the respect and confidence of the man being interviewed. He must be patient, considerate, and sincere.

(7) Differences in the background of the interviewer and of the man may lead to a misinterpretation of the questions or of the answers given unless the interviewer is alert to this possibility.

Section VIII

EVALUATION OF STUDENT PERFORMANCE

	Paragraph
Introduction	101
Evaluation of responses to test items	102
Interpretation of total test scores	103
Assigning grades	104
Using grades	105

101. Introduction.—*a. Evaluation of test results.*—The purpose of testing (see par. 69) can be fulfilled only by proper evaluation of student performance in good test situations. In the preceding sections of this chapter, the problems of *what to measure* and *how to measure* have been considered. The next problem facing instructors is that of interpreting test results so that they will be of value in the training program.

b. Three steps in interpreting test results.—(1) *Analyze the student's responses to the separate items* (see par. 102).—This analysis is made in order that—

(*a*) Weaknesses or gaps in student mastery of instructional material can be determined and remedied by further instruction.

(*b*) Instructional inefficiency can be located.

(*c*) Student learning can be expedited by a detailed discussion of the examination.

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(2) *Interpret total test scores* (see par. 103).—The over-all results of a test situation are required in order to—

(*a*) Separate the qualified students from those not qualified to perform the task or job.

(*b*) Indicate the relative degree of mastery each student has attained.

(3) *Assign interpretative grades* (see pars. 104 and 105).—Grades are indices of the instructor's final evaluation of students' performance in a subject or course. While grades may occasionally be assigned to scores from a single test or observation, most grades will be based on the combined results of several tests and a number of observations.

c. Test results should be interpreted with caution.—Too much importance should not be assigned to a single test record; even a student's performance on a carefully constructed and administered test must be cautiously interpreted. The reason for this caution is that all test responses, observations, and scores are subject to various small factors that are usually called random errors. Because of these random errors, a student who makes a score of 59 on one test may make a score of 63 on a comparable test given under slightly different conditions, at a different time, or under a different instructor. A similar situation occurs on a rifle range where a rifle fastened in a vise will show some scatter in the shot pattern because of wind variations, powder variations, lead deposits in the barrel, and other similar factors. Likewise, a student's response to a test item, or his behavior in the test situation, will show some misses because of certain factors occurring—

(1) *In the test*, as ambiguities, poor selection of items, poor printing, distractions in the test environment.

(2) *In the student*, as poor physical condition, emotional upsets, reading too fast.

(3) *In the instructional situation*, as variation in scoring standards, absences due to illness or companying details.

102. Evaluation of responses to test items.—*a. Procedure.*—(1) *Prepare a summary of the errors made on each item by the class.*—By check marks along side of the item on an unused test record form or on a separate sheet, the instructor can record the number of errors made on each item.

(2) *Group the items missed in terms of—*

(*a*) *Teaching objectives.*—An instructor may find that nearly all items relating to one or more teaching objectives were missed. If this happens, it usually indicates inadequate instruction.

(*b*) *Similar types of items.*—If a large number of errors are made on a performance test but not on an oral test covering the same material, either the students have not learned to do the job or the test

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was set up improperly, perhaps with faulty directions or ambiguous items. The directions and items should be carefully studied and revised, if necessary, before the test is used again.

(3) *Analyze the type of error made.*—Clues to the students' misunderstanding or to weakness of instruction can often be found in the students' responses or behavior. For example, the way the students responded may indicate that the terms used were misunderstood, or the directions for performing an operation in a certain way were not clear. An analysis of this type will be of value in discussing the examination with the students as well as in improving future instruction.

(4) *Analyze the errors made by individual students.*—The responses of all students should be studied, but the responses of low-scoring students will require more careful attention than will those of the more capable men. A few errors may be due to a student's absence from one or more class meetings while other errors are traceable to slowness in mastering the subject matter. The instructor should locate the source of a student's errors and initiate the necessary corrective measures, such as special classes, individual help, or reviews.

b. Cautions.—(1) The terminology and phraseology used in the directions and in the statement of the behavior to be observed will often be misunderstood or will be interpreted in different ways. Such misunderstandings or variations in interpretation will result in errors that are not evidence of faulty instruction or incorrect learning.

(2) A student's physical or emotional condition will influence his behaviour in a test situation. A student who is sick or worried will frequently make errors on subject matter that he has mastered.

(3) Failure on the part of the instructor to put the men at ease, to get them to do their best, or to provide a good testing environment will result in errors on the test. Consequently, proper test administration is essential to secure meaningful test results.

103. Interpretation of total test scores.—*a. Procedure.*—The total (or raw) score on a test or observation must be interpreted in relation to the achievement of other students in the same test situation and to the ability of the students to perform the task in the field. The instructor will—

(1) Determine the critical score or passing mark.

(2) Convert the scores to common numerical values.

b. Determining the critical score or passing mark.—Based on past performance of students on the job and on the test, a critical score or

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passing mark is set which indicates the division between satisfactory and unsatisfactory performance.

(1) The procedure in setting a passing mark requires the use of information other than that supplied by the test itself.

(*a*) *Instructor's opinion.*—If, *in the opinion of the instructor*, the student's performance is satisfactory, the man passes. The experience and judgment of the instructor provide a criterion that sets the passing mark. This procedure should be used with caution; the opinion of several instructors should be combined for the final decision as to the standards defining an adequate performance.

(*b*) *Student performance in the field.*—If the records of the performance of students who have taken the test or have been under observation are available, they can be divided into a satisfactory and an unsatisfactory group. The passing mark can then be set as that score which three-quarters of the *satisfactory* students exceed. The records of a large number of students should be used in setting the passing mark, and the assistance of personnel in a test section, or men with similar qualifications, should be used whenever possible.

(*c*) *Average scores of several classes.*—These can be used as a standard to determine whether any total score or set of scores is good or poor. If the score, or scores, are above the average of previous classes, the performance can be considered good; if below, then the performance is less satisfactory.

(*d*) *Statistical analysis of test.*—A test section may have the qualified personnel, the time, and the facilities to evaluate each test in terms of the ability of the students to do the job in the field. If this can be done, the passing score will be between the lowest grade made by the men who do the job satisfactorily and the highest grade made by those men who fail to do the job. Tests developed and analyzed in this way will be of assistance in estimating the extent to which the student is qualified on the technical or practical phases of the job.

(2) It is a misconception to believe that any predetermined arbitrary score, such as 70 percent correct responses, is evidence of satisfactory work. Passing marks must be based on a consideration of the ability of the men to do the job in the field and upon the standards agreed upon as being necessary qualifications for the adequate performance of this job. There is no arbitrary value which can be assigned as passing before the test is given. The scores of a group of students all qualified to do the work may be above 90 percent on one instructor's test while on another instructor's test they may all fall below 50 percent. The practice of setting a value, as 70 percent correct responses, as the passing mark before the test is given should be eliminated.

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c. Converting the scores to common numerical values.—This is essential if the test results are to be used in estimating the relative achievement of each man, in comparing his achievement on one test with his achievement on another test, in determining a fair evaluation of the man's ability, and in computing a final grade for that phase of subject matter. The scores may be converted into common numerical values in several ways:

(1) *The translation graph.*—Test scores can be converted into numerical grades as illustrated in figure 57. This shows how the scores on an 80-item test were translated into numerical grades. The range of test scores is divided into convenient intervals and used to define the scale along the bottom of the translation graph. The highest test score (75 points in the example) is to be given a numerical grade of 100. The lowest score made by a man who is qualified to pass (30 points in the example) is assigned a numerical grade of 50. These two points are located on the graph (see small circles on fig. 57) and a straight line (the translation line) is drawn through them and extended to the left side of the graph. It may be desirable to curve the translation line at the lower end so as to make a test score of zero coincide with a numerical grade of zero. The numerical values for each test score are then read from the scale along the left side of the graph as follows:

(*a*) Locate the test score along the basis line. (A test score of 46 is an example.)

(*b*) Find the point on the translation line which is directly above this score. (See the dotted line extending upward to the point marked (x) on the translation line.)

(*c*) Read from the left-hand scale the numerical grade which is directly opposite this point. (See dotted line from (x) to point 68 on left-hand side.) This is the grade to be assigned to the test score.

(2) *The percentage of correct responses.*—By the ordinary methods of figuring percentages, this is computed in terms of the total number of items on the test.

(3) *Percentiles and standard scores.*—These are the most useful numerical values, but their computation should not be undertaken unless qualified personnel are available to compute and interpret the values.

d. Evaluation of personal characteristics.—Because personal characteristics cannot be measured as precisely as skills and knowledge, their interpretation is more complex and subjective. Through the use of carefully prepared check lists, rating forms, and well-planned interviews and observations, however, personal characteristics can

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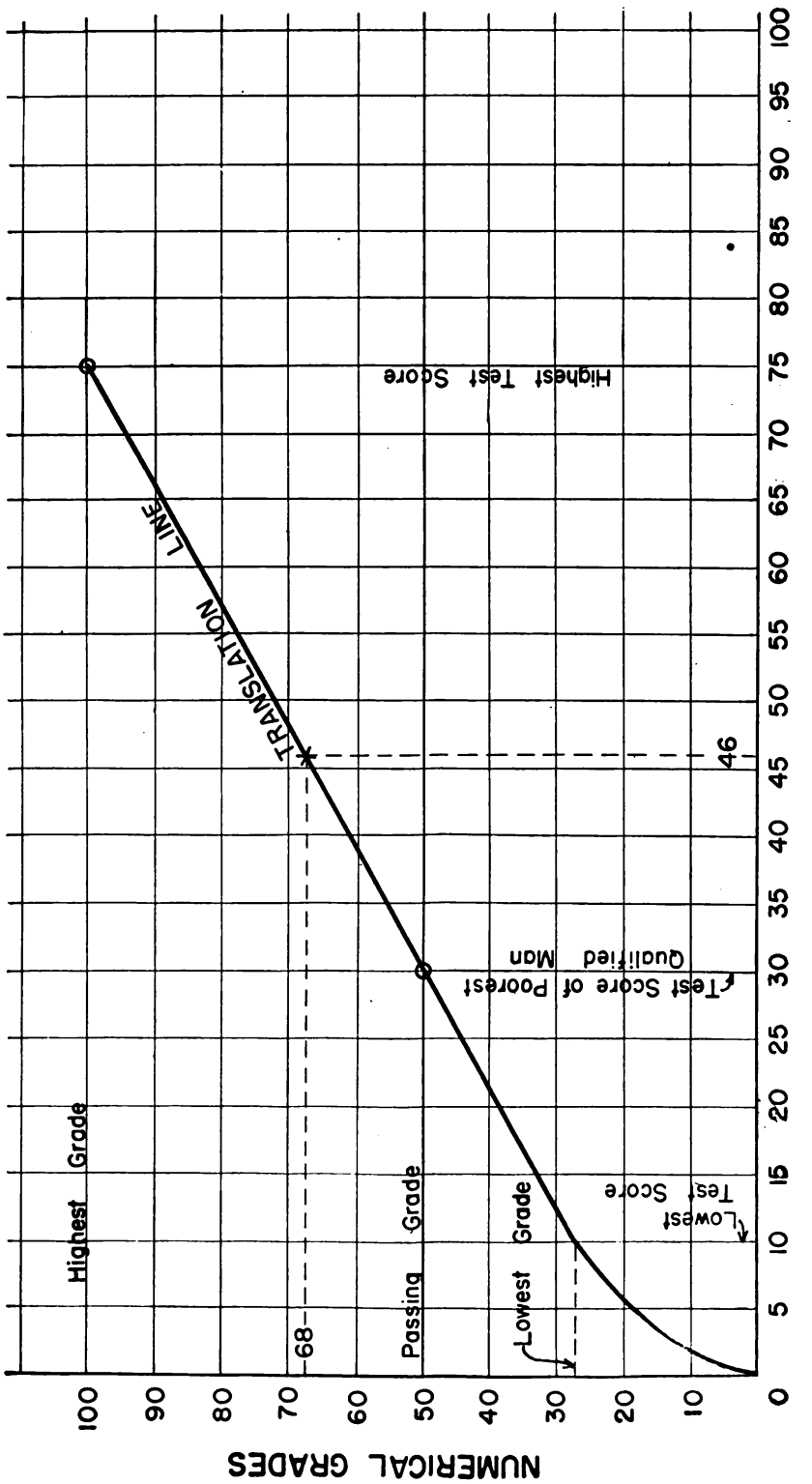


FIGURE 57.—Translation graph showing graphic method of assigning numerical grades to test scores.

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be evaluated with satisfactory accuracy. Except for the fact that the results must be interpreted with more caution, the procedures to be used in converting the scores to common numerical values are the same as described above.

e. Cautions to be observed.—(1) *A test score in itself is meaningless.*—For example, a zero score does not mean that a student knows nothing about the subject, nor does a perfect score mean that the student knows everything. A zero score means that the test was far too difficult to measure what the student had learned, while the perfect score may mean that the test was too easy. The zero score and the perfect score simply mean, respectively, that a student has answered none of the test items correctly, or has answered all correctly. Likewise, two scores, one of 40 and another of 80, cannot be interpreted by themselves as meaning that one student has achieved twice as much as another. All that the instructor knows from these two scores is that one student made 40 points more than did the other.

(2) *Scores for different tests are not directly comparable.*—Two identical scores made on different tests do not mean the same thing unless the two tests are carefully equated; that is, unless the tests serve the same purpose, have the same number of items, are equally difficult, and are equally valid and reliable. Since these conditions rarely hold, except in the case of the most carefully constructed tests, it is unsafe to compare the raw scores from different tests.

(3) *Test scores should be evaluated in terms of the coverage of fundamentals.*—Satisfactory scores on tests of minimum essentials will be nearly perfect, but such tests are rarely developed because of errors of judgment in the selection of items. Most tests must be evaluated in terms of how well they cover the fundamentals of the material and of what students do on the test and in the field.

(4) *Observation techniques do not give as precise results as the better written or performance tests.*—The results of the methods of controlled observation are dependent upon proper statement of the behavior being observed and the ability of the observer to observe accurately the students' performance.

104. Assigning grades.—*a. Definition.*—Grades are the final evaluations of a student's achievement in a subject or course. They are often expressed as letters A, B, C, D, F; as numerals, I, II, III, IV, V; or as average test scores (translated numerical values, percentage grades, percentiles, or standard scores). Grades are based on combinations of the various records of a student's performance and are subject to the fallibility of an instructor's judgment in making the

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separate evaluations and in deciding on the particular combination he will use.

b. Procedure.—In order that his grades will represent his best judgment and be of the greatest usefulness, an instructor should—

(1) Estimate the relative importance of the students' separate performance records.

(2) Utilize all available test results.

(3) Convert the combined test results into the accepted grading system.

c. Estimating the relative importance of separate test results.—Not all information about a student's performance is of equal importance. In an officers' training program, the leadership ability and cooperativeness of the student will be of greater importance than the scores on a test covering Army organization. Likewise, the scores on a test on map reading will be of greater value in indicating the ability of an officer to carry out a tactical assignment than will the score on a test on care of equipment; but a test covering tactical principles would be equal to, or greater in importance than, the test on map reading in this situation. The instructor or officer in charge must decide on the relative importance of the available test results as evaluated in terms of the training mission and success in the field. This decision will be difficult to make, and the opinions of several officers and instructors should be combined in making this judgment. The decisions should be made in terms of—

(1) *Objectives of the course.*—The instructor, in determining the students' grade, should estimate the relative importance of the teaching objectives which each test is measuring. For example, the training mission for company and personnel clerks calls for the students' knowing how to prepare such records as morning reports, reports of change, ration returns, and the service record. These things the student must know. The students' aggressiveness, personal appearance, and reaction to orders may be judged to be only one-third as important in evaluating his ability as a company clerk as his ability to prepare the various records. Then these personal characteristics would be given only one-third the consideration in determining the final grade.

(2) *Accuracy with which the test measures these objectives.*—The instructor must estimate the success with which his tests measure specific objectives. The results of highly valid and reliable measures (see par. 74) of a particular objective should be considered as worth more than those of less valid or reliable measures of the same objectives. The results of controlled observation of such personal characteristics

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as leadership, cooperativeness, and courage made with check lists and rating forms should be given more weight than the results of uncontrolled casual observation. Ability to read maps, to make the field operating tests on a telephone, or to clear a machine-gun stoppage can be fairly accurately evaluated by performance and written tests. The results of comprehensive, carefully constructed tests of these and similar abilities should be considered as giving more information about the students' achievement than short or hastily constructed tests.

(3) *Numerical test weights which represent the best judgment the instructor can make* regarding the importance of the objectives and the accuracy with which they are measured. The weights are numbers which indicate the relative value of the test in evaluating a student's achievement. The system of numbers to be used is entirely arbitrary, but one convenient system uses values between unity and ten. The test covering the least important objective inadequately could be assigned a value of unity, while the test measuring the most important objective adequately could be given a value of ten. The combined judgments of several officers in charge and instructors should be secured as to the precise numerical weight to be assigned to a test.

d. Utilizing all available test results.—After estimating the numerical weights to be given each test score and after translating all test scores into common numerical values, the next step is to utilize all available test results by combining them to secure a single numerical grade which represents the over-all achievement of the student. The steps follow:

(1) Make certain that all test results are expressed in the same common numerical values (see par. 103*c*).

(2) Multiply the common numerical values on each test by the numerical weight representing the relative importance of that test (see *c* above). For example, if the weight assigned to a subject final examination were four, the common numerical values for that test (representing the test scores) would each be multiplied by four.

(3) Add the weighted test values obtained from (2) above and divide by the number of tests to obtain the average. This is the student's combined numerical grade.

e. Converting combined numerical grades into letter grades.—It is frequently more convenient to use broad categories as summary reports of student achievement than to use numerical grades. Letters can be used as grades: A, superior; B, excellent; C, good; D, fair; and F, unsatisfactory. (The same categories may also be represented by the Roman numerals I, II, III, IV, and V.)

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(1) The combined numerical grades can be converted into letter grades as follows:

(*a*) In courses having a large number of students representing all levels of ability, the distribution of letter grades might approximate one of the two series of percentages below. (See fig. 58.)

Letter grade:	*Proportion of students in class receiving each letter grade Percent*
A (superior)	10 or 7
B (excellent)	20 or 24
C (good)	40 or 38
D (fair)	20 or 24
F (unsatisfactory)	10 or 7

(*b*) In a class covering advanced or technical materials the proportion of men receiving A's, F's, or any of the other letter grades, may be higher or lower than shown above. If the subject matter is relatively simple, if the standards of performance required are relatively low, or the group of students possesses outstanding ability, the percent of students receiving A's and B's will tend to be higher as shown in figure 58③. If, on the other hand, the subject matter is highly technical or advanced, if the standards of performance are high, or the students have only limited ability, the proportion of students receiving D's and F's will be higher as shown in figure 58②.

(2) Test scores can be converted into letter grades by means of the minimum standards required for the job.

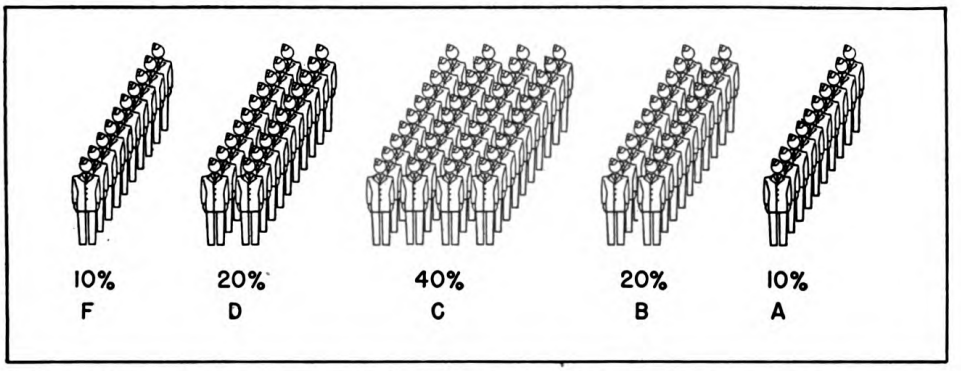
(*a*) In training courses where the aim is to have every student qualify, a two-point grading system using the letters S (satisfactory) and U (unsatisfactory) may be sufficient. Such a grading system requires a clear statement of the minimum standards prescribed for qualification.

(*b*) Where degrees of excellence are of value in assigning students after training, the qualifications required for the various jobs will be used to determine the ratings of expert, semiskilled, or helper.

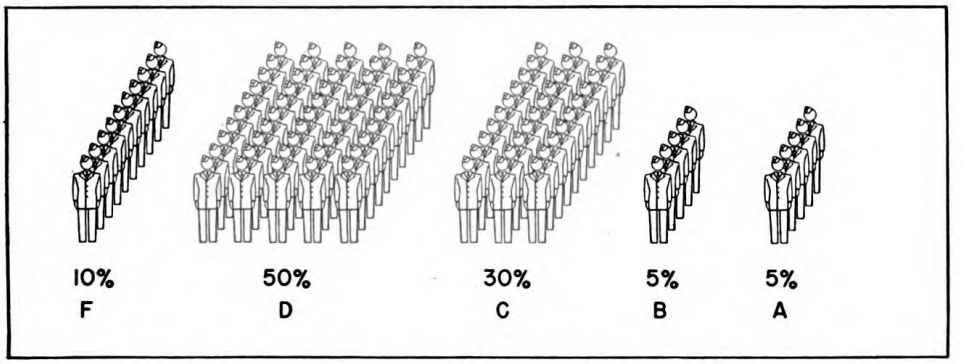
(3) The technique used in converting test scores to letter grades will depend upon the job for which the men are being trained. Wherever only minimum standards are required, these standards should be used to set the passing mark, the percent of F's or U's being determined by these standards. The four letters, A, B, C, and D, can then be used to indicate the relative degrees of excellence attained by all individuals who have passed the minimum standards.

f. Alternative method of combining test results.—Some check lists, ratings, oral tests, and interview judgments may result in evaluations involving only a few broad categories such as A, B, C, D, F or a small range of numerical values; the results of such testing devices cannot

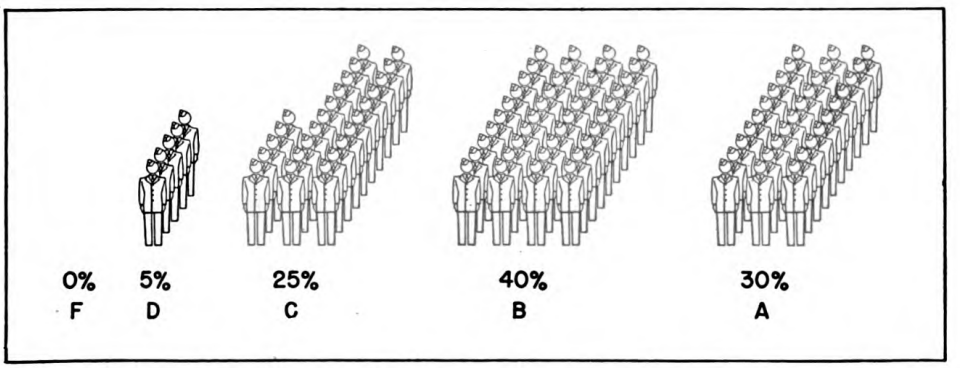
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① Proportions of men receiving indicated letter grades in class comprising all levels of ability.



② Proportions of men receiving indicated letter grades in class composed primarily of students of low ability.



③ Proportions of men receiving indicated letter grades in class composed mainly of men of high ability.

FIGURE 58.—Distribution of grades in various types of classes.

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be combined directly with the numerical values assigned to written and performance test results. Whenever this occurs the results from the separate test devices can each be translated into letter grades A, B, C, D, F (see *e* above) to which are assigned the values 4, 3, 2, 1, 0, respectively. These new numerical values can then be multiplied by the test weights for each testing device (see *c* above) and final grades determined as outlined in *d* above.

g. Cautions.—The process of assigning grades is one that depends largely on the judgment of an instructor or the officer in charge. In order to make the process as fair and unbiased as possible, the instructor should—

(1) Have a clear and definite statement of the procedures used.

(2) Use the same system of common numerical values throughout his evaluation program.

(3) Use the same range of test weights in combining test scores at different times.

(4) Combine tests in the same manner each time in determining final numerical grades.

(5) Eliminate personal prejudice or bias in his evaluation of a student's performance.

(6) Keep in mind the fact that students differ in ability to do the job for which they are being trained and that the grades should indicate these differences.

105. Using grades.—Grades are used in several ways, the most important of which are in—

a. Classifying and assigning personnel.—Grades are a useful index of a man's competence to perform specified military tasks, for they represent a summary judgment of his abilities as determined from combined test scores measuring the important abilities, attitudes, and behavior. Grades are an estimate of whether a man is capable of doing certain types of work and of how well he can be expected to execute them. Consequently, grades are of value in the proper classification of personnel and in assigning them to those duties in which they can make the greatest contribution to the military effort.

b. Counseling students.—Grades can be used to improve the quality of work done by students. High grades are frequently a source of satisfaction to a man who has applied himself and has achieved a high standing in his class. Low grades may stimulate a man to work harder and improve his standing, but equally often low grades discourage those who are not doing well unless the instructor tells them specifically why they have been marked down and aids them in improving their work. If a man consistently receives low grades in one type of work, it may indicate that he is not well qualified for

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such tasks and that he should be assigned to duties more directly in line with his capabilities. Low grades do not, therefore, indicate that a man is a poor soldier nor that he is incapable of becoming a good one. It is the responsibility of every instructor to tell his students exactly what he expects of them, how and why the grades have been given, and in what ways the students can profit from knowing what their past achievement has been. Therefore, assigning a man a grade is by no means the final step in instruction.

c. Evaluating and improving instructional programs.—Grades can be used by supervisors, directors of training, and commanders to estimate the efficiency of instruction in their training center. The average grades of different classes taking the same instructional program, when compared with the average aptitude of the students, will aid in estimating how well the separate instructors in a given course are fulfilling teaching responsibilities, and which phases of the instructional program require immediate attention. In this way, class grades can be used by the administrative staff much as individual grades are used by instructors. If grades are used for these purposes, they should be supplemented by a consideration of all the factors in the training situation which the supervisors have noted and evaluated. Some instructors may be working in more difficult situations than others; the training facilities may vary from class to class even in the same training program; some instructors may hold higher standards than others and therefore give lower grades; and, as mentioned above, some classes may have greater aptitude for learning. Average grades may be used in evaluating the instructional efficiency in different classes of the *same* subject or course, but they should not be used in making comparisons between *different* subjects or courses.

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DISCUSSION AND CRITIQUE

CHAPTER 6

DISCUSSION AND CRITIQUE

	Paragraphs
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SECTION I

GENERAL

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106. Definition.—A discussion and critique, the final stage of instruction, follows the application or examination. Its functions are to give a complete picture of what has been taught and to clarify any phases of the lesson or problem which are not entirely understood. The term critique is usually restricted to that summary or review given after an applicatory exercise.

107. Purpose.—The question is frequently asked, "Why have a discussion and critique?" The answer is that without a summary discussion at the end of a lesson or an applicatory exercise, the students may not have a clear, orderly idea of what has been taught. Good instruction involves intelligent, tactful, and constructive criticism. This criticism can be given most effectively in a group discussion held after the exercise or problem. The critique or discussion can be used to—

a. Sum up and clarify a situation developed in the lesson and to point out correct or incorrect methods of execution.

b. Provide an over-all view of the entire applicatory operation or maneuver for the personnel concerned.

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c. Indicate the strong and the weak points of a performance and the methods or procedures to be used in correcting errors or mistakes.

d. Emphasize the fundamental points of the lesson in such a way that approved solutions and constructive criticism of other procedures or solutions are presented.

e. Develop among the personnel a spirit of unity and an appreciation of the cooperation and teamwork necessary in military activities.

108. General considerations.—*a. Human relations are important.*—The instructor must remember that he is training men. He should refrain from using sarcasm and make his criticisms or comments in a straight-forward, impersonal manner. If it becomes necessary for him to make any personal comments, they should be made in private.

b. The critique should relate the exercise to the subject or course.—The critique should emphasize the continuous nature of training by calling attention to what has been done earlier and to the relation of the present lesson or exercise to the subject or course of which it is a part.

c. The reasons for preferred solutions should be reviewed.—The critique or discussion that follows an examination should include a review of the reasons for the answers to the separate questions and provision for the students to offer their own suggestions. A well-constructed test is not only a device to measure what has been learned but also contributes to the students' learning. Such learning does not occur, however, if the students are left with no explanation of their grades or the errors made. The discussion provides an opportunity for the instructor to show the students what they have and have not mastered. The students who have attempted either to apply a principle, to carry out a performance, or to answer a question will be able to see the reasons for the preferred procedures or solutions more clearly than during the initial presentation. This discussion often indicates ambiguities in the questions or other errors which the instructor should be willing to acknowledge and should correct immediately.

d. Specific points should be covered.—The discussion and critique should deal with specific and significant phases of the lesson or problem. If given after an examination, that examination should be in the hands of the students and the examination points discussed. If they follow an application, the procedures used, the examples of personal initiative or ingenuity, the type of errors and the ways for correcting them should be covered specifically. After an applicatory exercise, the terrain can be reconstructed on a sand table or portrayed by a simple map. Paragraphs 106 to 121, inclusive, FM 21–5, indicates

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the points that an instructor conducting a critique or an applicatory exercise should consider. An instructor who is conducting unit training should be thoroughly familiar with these paragraphs and with section V, FM 21–5.

e. Fundamentals should be emphasized.—The critique which follows an applicatory exercise should indicate the various acceptable solutions; it should not convey the impression that there is but one correct method of solving the problem. Such a misconception leads to the adoption of fixed forms and to attempts to guess what the instructor wants; the result is loss of initiative and independent thought. The critique should emphasize the fundamental principles of the tactics in a situation, and should criticize and evaluate the different student solutions on the basis of their completeness and efficacy.

f. Utilizing experience of personnel.—In both individual and team performances, certain individuals will have had experiences that will be of value to all personnel in clarifying the operation that took place. The director should take advantage of the experiences of these men in the critique or discussion.

(1) In maneuvers involving several teams or units, the commanders of each may be called upon to explain briefly the operations they carried out and to indicate the tactical principles that called for the particular operation. The comments to be made by each unit commander should be submitted to the director prior to the critique. In conducting such a general conference-type critique, the director should at all times be in charge of the proceedings. No arguments or personal comments should be permitted. The director may find it necessary to summarize the entire operation in order to be certain that the total situation and the basic tactical operations are entirely clear to all the men.

(2) After an individual performance or an examination, the instructor can use the directed discussion technique and let the men in his class assist in organizing and summarizing the fundamental points of the lesson. He should be careful to keep the discussion definitely on the topic and to prevent any one student from monopolizing the conversation.

g. Expediting learning.—Learning should be facilitated, as suggested in chapter 3, by setting the stage, administering the class, handling the men, emphasizing repeatedly the important points, utilizing praise and recognition as motivating devices, and maintaining a calm, patient, and understanding attitude.

109. Follow-up of the critique.—*a.* No training process can be considered to have stopped at any one of the five stages—preparation,

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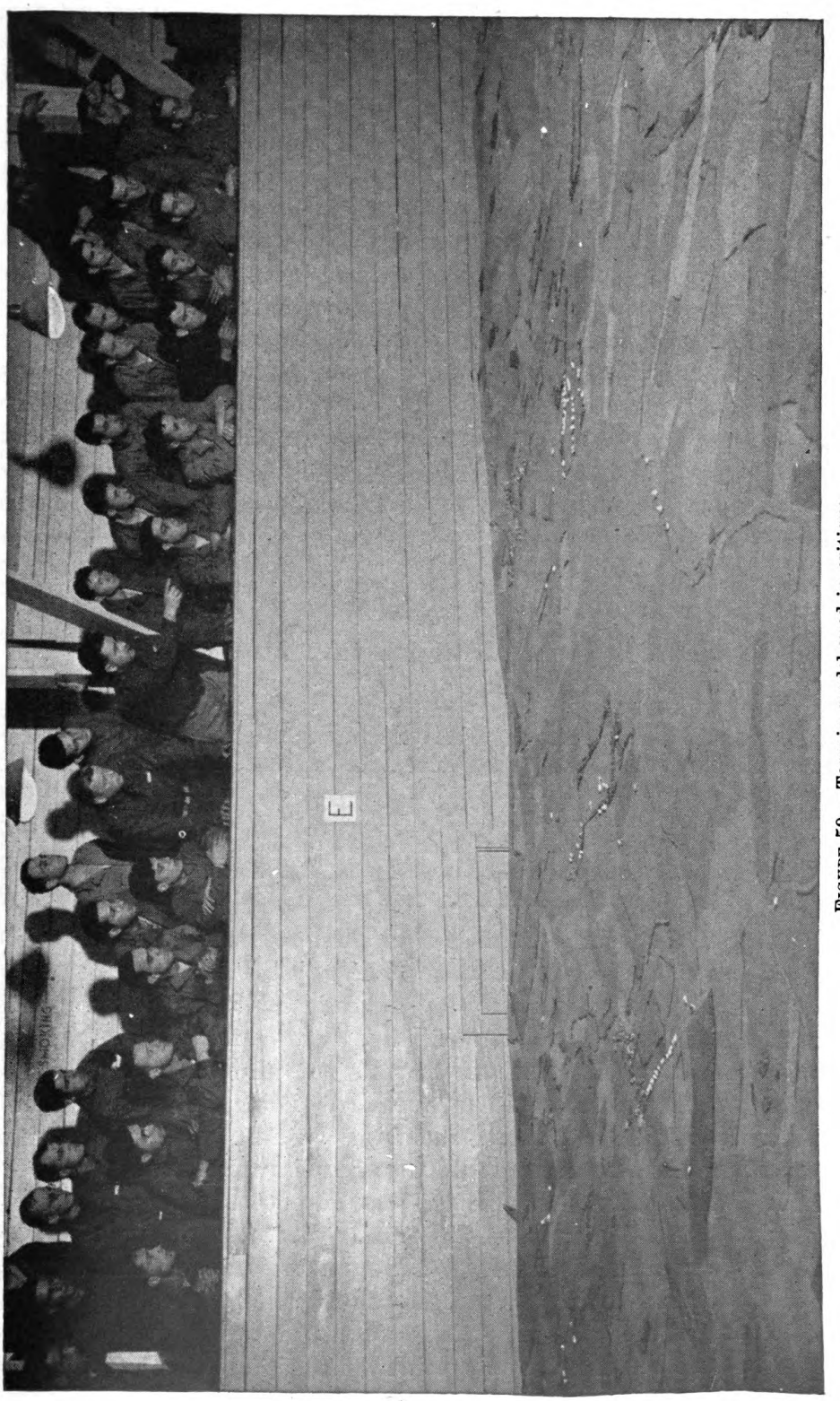


FIGURE 59.—Terrain model used in critique.

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presentation, application, examination, and discussion and critique. Because training is continuous, the various lessons must be related to each other and to the course objective. After a lesson, the instructor, in later lessons, should watch for evidences of insufficient learning or disregard of the materials of previous lessons. Each critique, then, provides an opportunity to correct wrong learning and to relate what was learned in one lesson to the other lessons of the subject or course.

b. After each critique, the suggestions or corrections should be kept in mind and used in later problems. New exercises should be set up which include not only a new tactical principle or a new method of procedure but also the materials already presented.

c. The follow-up of the discussion by the instructor will also indicate whether certain individuals in his command have leadership possibilities. Those individuals who profit from the suggestions and criticisms presented in the critique and who use initiative and ingenuity in applying these suggestions in the solution of later problems may well be the future Army leaders.

SECTION II

CONDUCTING A DISCUSSION AND CRITIQUE

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The director 110
Preparation 111
Taking notes and preparing cut-sheets 112
Planning the three steps 113
Time for critique 114
Location of critique 115
Techniques of conducting discussion and critique 116
Cautions to be observed 117

110. The director.—Because a discussion and critique is essentially a lecture or directed discussion, the part the instructor or director plays is fundamental to its success. His personality, poise, enthusiasm, physical vitality, earnestness, and genuine interest in his subject will be reflected in the learning of his students. The instructor appearing before his group tired, uncertain, or in an impatient mood will be unable to hold the attention of his men or to secure their whole-hearted participation in the discussion.

111. Preparation.—*a.* The critique cannot be planned as thoroughly as can the other stages of training, because the points to be covered are influenced directly by the performance of the students and their reaction to the other stages of instruction. The preparation will consist of the selection of a location, the determination of the length of time between the performance or examination and the dis-

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cussion, the taking of complete notes during the performance, and the securing of any training aids or expedients which may be necessary in order to develop the points the instructor wishes to bring out.

b. In planning for the critique, the instructor or director should keep in mind the standards of achievement that he expects of his men. In the early stages of training, the emphasis should be upon accuracy of performance. In the later stages, the emphasis should be placed upon team cooperation, the coordination of movements and operations, and both speed and accuracy of performance.

c. The preparation for a discussion of an examination will include a review of the errors that had been made, a tabulation of the most frequent errors, and planning a discussion that will indicate the *what*, *where*, *when*, *why*, and *how* of these points.

d. The preparation for a critique following a team performance will require close observation of the procedures used in the exercise and a review of the tactical and technical doctrines. The instructor or director will frequently find that the errors in the performance are due to—

(1) Carelessness or inappropriate action on the part of the director or umpire.

(2) An attempt to do too much in one exercise.

(3) The use of inappropriate terrain.

(4) A complicated tactical situation which is too advanced for the training of the unit.

112. Taking notes and preparing cut-sheets.—Taking notes during the performance or developing a cut-sheet or list of errors on an examination is necessary in order to select materials wisely. On a field exercise, the instructor should note the various points of technique, field orders, decisions, and cooperation of units to insure that these will be covered in the critique in such a way that future action will be improved. The notes can be brief and may consist merely of a comment, such as "observing around the wrong side of a post," "sights not blackened," or "lounging around the switchboard." Careful observation requires that the instructor be well-trained in advance, not only in the materials of his lesson or the principles of his exercise, but also in the techniques of supervision and umpiring. (See ch. VII and FM 105–5.)

113. Planning the three steps.—Whether the instructor uses a lecture or directed discussion, the explanation should be planned in terms of three definite steps:

a. An introduction giving an over-all view of the lesson or problem.

b. A discussion of the strong or weak points.

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c. A brief summary which emphasizes the fundamental points of the lesson or problem.

114. Time for critique.—*a.* In general, a critique or discussion is given as soon as possible after the application and examination. Criticisms have more meaning when they are given soon after the performance has been completed. On the other hand, men who are tired, dispirited, hungry, or sleepy will not take kindly to criticism, nor will they have the energy and interest necessary for the desired individual participation in the discussion. The time for discussion is as soon after the performance. The discussion which is carried on after to participate in or listen to it.

b. Individual performance usually will be followed immediately by an examination and a discussion and critique after the examination. It frequently happens, however, that the instructor will note common errors in the application that should be corrected before the examination. A brief discussion preceding the examination should be held. The instructor should then expect that these errors will not occur in the examination or in a repeated application. Therefore, individual training in basic and technical subjects will frequently call for a discussion immediately after the application as well as after the examination. In either case, the discussion should be planned as a part of the lesson and carried out within the scheduled time.

c. Team training offers two places for a discussion, before and after the performance. The discussion which is carried on after the exercise is the primary concern of this chapter, but it should not be forgotten that a brief preliminary discussion of the tactical operations or procedures will improve the performance. The preliminary discussion should include a concise review of the tactical principles and a statement of the objective of the problem. In the critique after the performance, these same tactical principles and techniques would again be discussed, any weaknesses in the performance noted with specific suggestions for improvement, and an over-all picture of the exercise presented. The problem of when to conduct this critique after the team performance is basically one of the condition of the participating personnel. If the men are fatigued, hungry, or dirty, they should be allowed time to clean up, rest, and eat before the critique. If the men have been on their feet during the exercise, they should be provided with a dry place to sit. To make such provision is the responsibility of the instructor, the director, or the chief umpire; and it will have a marked effect on the results obtained from the discussion.

115. Location of critique.—*a.* The discussion following individual performances will usually take place in the same teaching location

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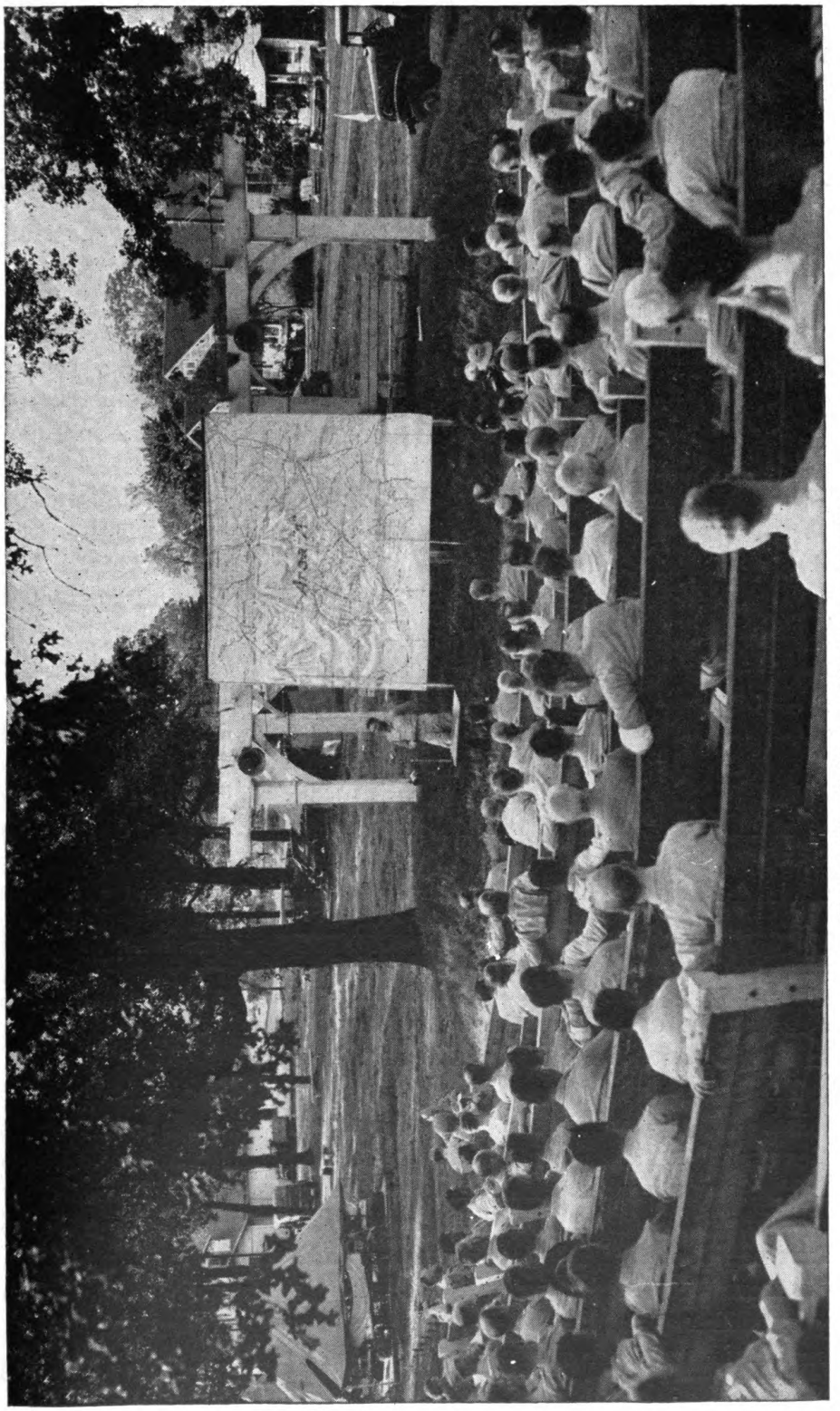


FIGURE 60.—Outdoor critique on maneuvers.

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in which the training was conducted. If this area is noisy or there are distractions such as on a rifle range, impact area, or grenade court, the critique should be conducted in some quiet place elsewhere.

b. Discussions following team performances that require considerable terrain and time for their completion should be conducted in a quiet, comfortable location. All the men should be able to see the director and training aids used and should be able to hear him easily. A few minutes spent in selecting a desirable location and transporting the troops to that place will be well worthwhile in terms of student interest and attention.

116. Techniques of conducting discussion and critique.—The techniques used in presenting a discussion and critique are similar to those in giving a lecture or directing a discussion. The instructor should review paragraphs 31 to 44, inclusive, for suggestions on effective presentations.

117. Cautions to be observed.—*a.* Because the technique of presentation is usually that of a lecture or a directed discussion, the weaknesses common to these techniques must be overcome. The critique should be brief, well illustrated, well planned, and conducted by an interested, enthusiastic officer. The personnel should be in a physical condition that will assist them in listening attentively.

b. The effect on the entire command must be considered. The operations of the staff should be a subject of discussion to the same degree as that of other units, but it may be desirable, whenever a staff is involved, to conduct several critiques in order that there may be no resentment or lowering of morale of any echelon of the unit taking part.

c. The conclusions of the critique should be reasonable and perfectly clear to all personnel participating. The biases of any of the officers should not be allowed to control the direction of the training. The reason for each conclusion should be clearly and logically developed, and the standards of performance expected should be reasonable in terms of the stage of training of the unit.

d. The training purpose of the discussion must be constantly kept in mind. Attention should be called to any errors made or incorrect tactics used during the problem, and recognition should be given to individuals who made outstanding contributions. No adverse comments should be made about any individual. If errors have been committed, a correct solution should be indicated and emphasized. When more than one correct solution is possible, a preferred solution may be indicated by the instructor. He should also emphasize that other solutions are permissible provided that the fundamental points are correct.

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CHAPTER 7

SUPERVISION

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SECTION I

GENERAL

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118. Introduction.—Supervision is that phase of training management which insures efficiency of training. An instructional program may be well planned, and adequate facilities and training expedients may be available, but unless the execution of these plans is efficient, instruction will not be effective. Proper supervision results in high standards in the conduct of training.

119. Purpose.—The objective of supervision is to direct training so as to make the most effective use of the means and time available to accomplish the training mission. (See par. 11, FM–215.) It is

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imperative that each commander realize that every training situation will present difficulties to be overcome and problems to be solved; no training program is ideal. It is only through effective administration that the best possible use can be made of the various factors in the instructional situation. Adequate supervision causes all instructors to take advantage of the means and time available.

120. Responsibility.—Supervision is a phase of training management; it is a function of command and therefore the responsibility of every unit commander. (See par. 12, FM 21–5.) Every commander must endeavor to carry out his training plan in the most effective manner and to remove the various administrative, physical, and human obstacles to training. (See par. 142 and par. 24, FM 21–5.) There can be no excuse for failure to utilize to the fullest extent any and all means of improving instruction.

121. Types of supervision.—Of the three types of supervision listed in paragraph 30, FM 21–5, this chapter is concerned only with the problems and procedures to be used in the daily supervision of instruction.

122. Bases for supervision.—The doctrines and procedures stated in FM 21–5, TF 7–295, and this manual are to be used as the guides for the supervision of instruction. Each officer in charge of a phase of training also is expected to be thoroughly familiar with the instructional materials listed in FM 21–6 and 21–7. Efficient supervision is based upon mastery of all materials related to instruction in the particular subject matter plus ingenuity, industry, and alertness on the part of the supervisor.

123. Conduct of supervision.—The following points must be considered:

a. Characteristics of the supervisor (see par. 124).
b. Selection of instructors (see pars. 125–127).
c. Training of instructors (see pars. 128–131).
d. Preparation of lesson plans and rehearsal (see pars. 16–21 and 25).
e. Observation of instruction (see pars. 132–136).
f. Improvement of instruction (see pars. 137–141).
g. Overcoming obstacles to efficient training (see pars. 142, 143; and par. 24, FM 21–5).

124. Characteristics of supervisor.—In order to supervise instruction effectively, the officer in charge must be well qualified in the subject matter, and must be an excellent instructor, a capable administrator, and a leader. Each supervisor will constantly strive to analyze his abilities and correct any weaknesses he may have.

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a. He must know the subject matter he is supervising.—He must know the doctrines and procedures, the most efficient instructional methods, and the useful training aids for whatever classes he supervises. This necessitates continual study on his part to make certain that his instructors are thoroughly prepared and make no mistakes, and that what they are teaching is in line with all recent developments.

b. He must be an excellent instructor.—The supervisor must be able to judge not only *what* the instructor is teaching but *how* he is teaching. He must be familiar with Army instructional methods, know what constitutes an effective lesson, how it should be presented and developed, and how instructional aids should be used. He should have at his finger tips the materials presented in FM 21–5, TF 7–295, and in this manual.

c. He must be a capable administrator.—Many of the supervisor's duties are administrative, and he should prepare himself to handle them expertly. He must know how to delegate responsibility and how to secure cooperation. He must be able to keep the broad outlines of the training program in mind and to see the relation of each part to the whole. He must remember that he is there to help the instructors do their job.

d. He must be a leader.—Just as the instructor is a leader of students, the supervisor is a leader of instructors. He is in fact an instructor at a higher echelon. He must be able to direct the instructors under his supervision so that they will do the best work possible. Fairness, firmness, and friendliness are essential characteristics both of a good supervisor and of a good instructor.

SECTION II

SELECTION OF INSTRUCTORS

Paragraph
Importance of careful selection 125
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Procedures to be used in selecting instructors 127

125. Importance of careful selection.—*a.* The relation of Army instruction to battle success is well known. The relation of the quality of instruction to the qualifications of the men who are acting as instructors is equally obvious. In the Army where highly developed skills and techniques must be acquired, it is of the greatest importance that the instructors be the best obtainable. Qualified instructors can be secured by proper selection and classification and by adequate training.

b. The supply of men possessing the qualifications of good instructors is sufficiently large to enable each commander to develop a capable

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Name of man rated

Basis of Ratings: 4—Superior 3—Excellent 2—Good 1—Fair 0—Unsatisfactory		Personnel officer	Officers in charge of training			Company commander	Interviewer
CHARACTERISTICS TO BE OBSERVED			(1)	(2)	(3)		
As soldier	Military bearing and appearance						
	Physical fitness						
	Reaction to orders and assignments						
	Behavior in barracks						
	Behavior in the field						
As leader	Leadership in Army activities						
	Leadership in civilian activities						
	Mental alertness						
	Willingness to take responsibility						
	Initiative and aggressiveness						
	Ability to make and carry out plans						
As specialist	Mastery of subject matter						
	Interest and enthusiasm						
As teacher	Interest in teaching						
	Interest in men						
	Instructional ability						
	Ability as a speaker						
	Date of rating						
	Initials of rater						

FIGURE 61.—Rating form for evaluating prospective instructors.

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staff. All supervisors will make use of the available information in classifying personnel for instructional assignments.

c. Men possessing the necessary aptitude for instruction will not make capable instructors until they have been trained in the subject matter and in methods of instruction. The training of instructors is considered in section III.

126. Qualifications of an instructor.—*a. Total pattern.*—When the potentialities of a man as an instructor are evaluated, his total pattern of qualities, and abilities as listed in figure 61 must be considered. No instructor should be selected only on the basis of one or two outstanding characteristics. Neither should a man be rejected because his ratings on a few qualities are low. The officers charged with selecting instructors should not pick only the top men in their classes as instructors. Just as a star football player may fail as a coach, so a bright student may not be the best instructor. The man who knows not only his subject matter but also the difficulties of learning is the man to consider as an instructor. There are certain standards that each instructor should meet—mastery of his subject, interest in teaching, and ability as a speaker. Deficiencies in some of the characteristics listed in figure 61, however, can be overcome through an adequate training program.

b. Soldier, leader, specialist, and teacher.—An Army instructor must in a sense be four men: a soldier, a leader, a specialist, and a teacher (see fig. 61). Men who possess these four characteristics to a satisfactory degree will be capable Army instructors.

127. Procedures to be used in selecting instructors.—*a. Tentative selection on records and observations.*—A tentative selection can be made from among the men available by the personnel officer and the various officers in charge of training. These officers have had opportunities to acquire the necessary information concerning the aptitudes of the men.

(1) The personnel officer has access to all records. For officers he can refer to W. D., A. G. O. Form 66–1 (Officers' and Warrant Officers' Qualification Card), and for enlisted men to W. D., A. G. O. Form 20 (Soldier's Qualification Card). From these he can secure information—

(*a*) On their experience and achievements in civilian and Army life.

(*b*) On the abilities of each man as indicated by test scores.

(2) The officers in charge of training will have had an opportunity to note in the field and in the classroom those men who appear to be qualified as Army leaders. These supervisors should make a conscientious effort to appraise as early as possible in the training

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program the instructional capabilities of the men in their classes and units.

b. Assignment to specialist training.—Those men being considered as instructors should then be assigned to specialist training to get a thorough grounding in the technical material which they may later teach. Special attention should be paid to the men's abilities and interests as revealed by their progress in their military specialties.

c. Rating scale.—The men considered to be potential instructors should be rated on the characteristics listed in figure 61 by several officers working independently. The personnel officer, the company commander, and at least three other officers who have had charge of some phase of the man's training should participate. The recommendation of the special services officer will often be useful. It may not be possible for every officer to rate each man on all the qualities in the rating scale, but he should judge as many as he can. The ratings on the specialist qualifications cannot be made until after the completion of the required technical training. Likewise, some of the ratings on teacher qualifications cannot be made until the training in instructional methods is completed. Furthermore, at least two ratings on each man should be made several weeks apart by the supervising officers in order to get a reliable estimate of the man's potentialities. (See par. 97.)

d. Interview.—To complete the initial selection, each man should be interviewed by the officer in charge. (See par. 100.)

e. Combining results of records, observations, rating scales, and interviews.—The information secured in steps *a*, *b*, *c*, and *d* above should be combined to get a comprehensive basis for deciding which men are to receive training in instructional methods.

f. Assignment to instructional training.—Following their specialist or technical training, the men should receive training in instructional methods and procedures as outlined in paragraphs 128 to 131, inclusive. Their achievement in specialist and instructional training provides a valid basis for the final selection of men competent to become Army instructors.

Section III

TRAINING OF INSTRUCTORS

	Paragraph
Training in instructional methods	128
Short course in instructional methods	129
Observing expert instructors	130
Supervised teaching	131

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128. Training in instructional methods.—Selection and training are two phases of a single procedure; both are necessary in developing an adequate instructional staff. The vital importance of good teaching in the Army demands that every prospective instructor be well trained in effective instructional methods as well as in the technical aspects of military science. The necessary training in instructional procedures and techniques can be secured by a short course of approximately two weeks' duration, by the observation of expert instructors, and by closely supervised teaching on the job. All three are essential.

129. Short course in instructional methods.—*a.* A brief course will insure that all prospective instructors have a fundamental understanding of Army teaching procedures. No commander would send troops untrained in combat practices into battle, and no officer in charge of training should be guilty of having his personnel taught by instructors who are not thoroughly familiar with instructional methods. An instructor skilled in presenting his subject matter, in directing applicatory exercises, in developing or using suitable examinations, and in conducting discussions and critiques will save countless hours of valuable student time. The time spent in training instructors will be repaid many times in the increased efficiency of the training program.

b. A course for instructors should be a model of the best that is known about the teaching process. It should be planned and executed in accordance with the highest standards by expert Army instructors so that every lecture, discussion, or demonstration will be conducted effectively. Frequent opportunities for application should be provided by having the students solve practical exercises that arise in training situations and by requiring them to teach lessons in their specialties to the class. The examinations used should conform to the principles stated in chapter 5, and the critiques should be conducted by masters of that art.

c. No rigidly organized instructors' course will meet every situation. The officer in charge should make a study of the needs of his unit, and on this basis should prepare a course plan that will be of greatest benefit. He will base his plan on the materials in FM 21–5, TF 7–295, and this manual. Emphasis should be given to—

(1) The role and importance of the instructor in the Army.
(2) The preparation required for teaching a lesson.
(3) The introductory step in presentation.
(4) Presenting a lesson using the techniques of—
(*a*) Explanation.
(*b*) Demonstration.

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(5) Planning and directing the application of materials learned.
(6) Developing and using examinations.
(7) Conducting a critique.
(8) Developing and using training aids.
(9) Securing and using textbooks and instructional materials.
(10) Understanding the student as a learner.

d. Practical problems are of great value in presenting situations of the type the instructors will face in the classroom. Each officer in charge of training instructors can develop fictitious situations, the solutions of which require a mastery of the instructional procedures and principles given in FM 21–5 and this manual. Some examples of such written problems are listed below.

(1) *Situation:* Group 5 is studying Army organization under Cpl. Jay. The class has been in progress for about 20 minutes and is now discussing the organization of the triangular division. Cpl. Dee and Cpl. Ess, both instructors in the same department, enter the classroom and seat themselves in the rear; they are free during the period and have come in to observe. At a controversial point in the discussion, Cpl. Dee interrupts and tells Cpl. Jay he's "all wet"; he proceeds to give his own explanation in a loud tone of voice. Soon Cpl. Ess interrupts with his own ideas on the subject, and the three instructors proceed to argue the case.

Problem: Point out the undesirable features of this situation from the point of view of good instruction and class discipline.

(2) *Situation:* Group B has assembled for its first class in "Morning Reports"; the class is scheduled to begin at 9:30 AM. While waiting for the instructor to appear, the students are talking among themselves. At 9:36, Sgt. Eks strolls leisurely into the room, carrying a notebook and a newspaper under his arm. He places the book and newspaper on the rostrum, then takes out his pocket comb and combs his hair back from over his forehead. While doing this, he walks over to the window and looks out. He then returns to his desk. At 9:40, he opens his notebook, and in a low sleepy voice begins to call the roll. When he reaches the fifth name—that of Pvt. Tee—he stops and loudly greets him. It appears that they had been bunkmates in the instructor's previous company. The two men spend the next 5 minutes discussing the previous day's baseball. The instructor uses his newspaper as a source of information. At 9:48, the instructor finishes calling the roll and proceeds with the lesson.

Problem: Point out the faults of this instructor and indicate how the class should be conducted. How will the class be affected by the behavior of this instructor?

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(3) *Situation:* Cpl. Ken is pointing out to his class on "Defense Against Aerial Attack" some of the identifying features of American airplanes. For this purpose he has brought into class a small-scale model of an American bomber. He asks the class (32 students) to gather round his desk, and he begins to point out features of the airplane. Within a few minutes the students at the outer edge of the circle are pushing and nudging one another in an attempt to get close enough to see the airplane model. A few are whispering among themselves and asking the ones in front for some of the information. Soon the group is completely out of order; only a few have learned anything.

Problem: Why did the instructor fail to achieve his aim? How could he have prevented such a situation as this?

e. Opportunities should be presented in the instructors' class for each student to present brief lessons. These lessons can be limited to 5 or 10 minutes at first, but after several brief lessons, the student instructors can be expected to present lessons taking from 30 to 50 minutes. The amount of practice teaching that will be required will vary with the experience and ability of the men being trained. In a 2-weeks' course at least one-half the time should be spent in practice teaching. Each lesson that is presented by the student instructors should be the subject of a thorough discussion, in which all members of the class and the officer in charge participate. Such discussions are of the greatest value in pointing out to the instructors the weaknesses of their technique and ways of improving their work.

130. Observing expert instructors.—*a.* Because demonstration is an effective means of teaching, the men being trained as instructors should have opportunities to observe expert Army instructors conducing their classes. This observation of practical demonstrations will provide an effective means of combining lectures and discussions on teaching methods with instruction as it is carried out in the class situation. The effective use of such demonstrations will require careful preparation on the part of the supervisor and some preliminary training of the students.

b. The student instructors will require training in the technique of observing an instructional demonstration. Immediately after they have been given an orientation to the problems of teaching, they should be provided with a mimeographed list of the important points to be observed in a classroom and taught to use this list. (See fig. 62,)

(1) The first observation should come early in the training program. This observation takes the place of a demonstration of how teaching should be conducted. One period devoted to presenting the

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points to be observed in teaching, when followed by an expert demonstration of instruction, will relate the lectures and discussions to the job these men are expected to do later. The training in how to observe should be based upon paragraphs 98, and 134 to 136, inclusive.

(2) The lesson plan and the exact procedure to be used by the demonstrating instructor must be carefully checked by the officer in charge and a rehearsal carried out before the observations are made. Not more than 20 student instructors at a time should observe in a teaching situation. The officer in charge should attend the demonstration and take notes on the instruction for the discussion to be developed later.

(3) Each student should observe the instruction carefully, using the rating form (fig. 62) and summarize his observations in a brief report to be turned in at the beginning of the discussion. For each of the points in the checklist the students are to state in their reports what they observed, the reason for their rating, and their suggestions for improving the instruction. These reports will then be checked by the officer in charge for completeness and returned to the students with a cut-sheet or written comments, calling attention to any errors of judgment and to any points they failed to observe.

c. After the report has been turned in, the officer in charge should discuss the important features of the instructional procedures as the introductory or the summary step for the lesson, or lessons, relating to the technique demonstrated in the observation period. The combination of observation, discussion, presentation, and written comments on students' reports will lead to effective instruction in teaching methods and procedures.

131. Supervised teaching.—After the student instructor has completed the short course and has observed critically several classes in which the various techniques have been demonstrated, he will be ready to step into a teaching assignment under close supervision. The instructors should not be considered as qualified until they have shown that they are capable of handling the problems that arise in a class. This requires the closest supervision by the officer in charge, the checking of all lesson plans and preparations, and conferences at frequent intervals in which the common instructional problems are discussed and solutions suggested. This supervised teaching is the final check on instructor training, just as combat success is the test of military training.

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SECTION IV

OBSERVATION OF INSTRUCTION

	Paragraph
Frequency of observation	132
Knowledge of the instructional situation	133
Points to be observed	134
Technique of observation	135
Procedures in observing classes	136

132. Frequency of observation.—The more frequently each instructor is observed, the better check the officer in charge can keep on the conduct of training. The effect on the training program as a whole is stimulating, since it keeps every instructor "on his toes" and the various phases of instruction coordinated. Supervisory visits are of two types: the brief daily visit, and supervision of entire class periods.

a. Brief daily visit.—It is desirable that the officer in charge visit each class for which he is responsible every time it meets. These visits usually will be brief and chiefly for the purpose of seeing that all classes are progressing with no obvious difficulties.

b. Supervision of entire class period.—From time to time the officer in charge must visit each class for an entire period to secure a comprehensive check on all aspects of instruction in that class. The frequence of these extended observations will depend upon the excellence and experience of his instructional staff. Inexperienced instructors and those who are doing poorly must be supervised frequently, and every effort made to correct all defects noted.

c. Supervision by other officers.—Frequent observation of classes by the other officers is of value in providing uniformly effective instruction and will tend to eliminate the undue emphasis that results from a supervisor's interest in some phase of training. Reports of the observations of the several supervisors or inspectors should be made available to the officer in charge of the class immediately as well as to the commanders in the higher echelons.

133. Knowledge of the instructional situation.—The supervising officer must know at all times what is being taught in the classes for which he is responsible. He should have available for immediate reference the schedule of classes and copies of the lesson plans. Before visiting a class for an entire period, the supervisor will familiarize himself with the proper lesson plan so that he will waste no time in evaluating the instructor's performance.

134. Points to be observed.—The factors each officer should consider may be organized into five major headings: the *classroom*, the *instructor*, the *students*, the *lesson*, and a *summary*. (See fig. 92.)

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a. Classroom (see sec. IV, ch. 2).—(1) *Location.*—Is it the best in terms of those that are available?

(2) *Appearance.*—Is the room clean and orderly?

(3) *Lighting and ventilation.*—Is there adequate light and air?

(4) *Seating arrangement.*—Can all the students see the instructor and any teaching aids that are used in the class?

(5) *Interest-destroying factors.*—Are there any features of the location which will distract the attention of the students or the instructor from the lesson itself?

b. Instructor (see sec. III, ch. 3).—(1) *Appearance.*—Does the instructor carry himself in a military manner? Is he neat? Is he wearing the proper uniform?

(2) *Physical vitality.*—Is he energetic and full of enthusiasm for his subject and for teaching?

(3) *Voice.*—Is his voice clear and understandable? Is it forceful? Does he speak too rapidly or too slowly? Does he vary the tempo of his speech to fit the ideas he is presenting?

(4) *Speech.*—Does the instructor have a good command of English? Does he develop ideas clearly and logically?

(5) *Bodily control.*—Does he use appropriate movements and gestures? Does he have any distracting mannerisms?

(6) *Direction of attention.*—Does he address his remarks in explanations to the class and not to the blackboard, chart, or to the windows or walls?

c. Students (see secs. I and VII, ch. 3).—(1) *Appearance.*—Do the students meet the standards of bearing and grooming?

(2) *Interest.*—Is there an active interest throughout the lesson? Do they appear to be attentive, earnest, and eager for knowledge?

(3) *Reactions to lesson.*—What are the students' reactions to the lesson as evidenced by unsolicited comments?

(4) *Attitude toward instructor.*—Is the attitude toward the instructor satisfactory? Do the students feel free to seek advice from the instructor? Have opportunities been provided the student to present his problems to the instructor?

d. Lesson (see chs. 2, 3, 4, 5, and 6).—(1) *Preparation.*—Is the instructor well prepared for the lesson? Is he competent in his subject? Does he have his teaching aids ready for use?

(2) *Presentation.*—(*a*) *Introduction.*—Does the introduction arouse the interest of the pupils and motivate the lesson? Is it a good length in comparison with the rest of the lesson?

(*b*) *Explanation and demonstration.*—Are the explanations and demonstrations clear and to the point? Does the instructor relate the new material to what the student already knows? Have the best in-

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structional methods been used? Are they used in accordance with the principles stated in FM 21–5 and this manual?

(3) *Application.*—Is the time devoted to individual and team application sufficient? How effective is the application? Are terrain and field exercises utilized to the fullest extent?

(4) *Examination.*—Are the students examined on the material just covered? Is the examination a valid one for the purpose?

(5) *Discussion and critique.*—Is it well conducted? Are all the important points summarized?

(6) *Procedures.*—Are the procedures which the instructor has employed appropriate in terms of the lesson? How effective were these which he used?

(7) *Teaching aids.*—Is the most effective use made of teaching aids?

(8) *Student participation.*—Are the students given an opportunity to participate in the lesson? What is the extent of participation?

e. Summary.—(1) *Effectiveness of lesson.*—Has the instructor attained the lesson objective? What is the apparent grasp of the subject by the students?

(2) *Major strengths.*—What are major strengths of the instructor? What were the outstanding features of the lesson?

(3) *Major weaknesses.*—What are the major weaknesses of the instructor? What are the faults which he should correct?

135. Technique of observation.—*a. Planned observations.*—A supervisor should have a *plan of observation* when he visits a class. He must know what factors to look for and to appraise, which are important, and which are irrelevant. Just going into a class and "looking" will not give the observer a comprehensive grasp of what is going on. In supervising instruction, a plan is as important as in teaching. The technique depends upon the training situation and the supervisor's preference. The most acceptable procedure is to use a short rating form as shown in figure 62 with a set of comprehensive notes on the other side. This combined technique enables the supervisor to see both the general plan and the details and insures that all important factors are checked.

b. Rating form.—(1) *Description.*—A rating form, developed for use in the observation of instruction, is shown in figure 62. It consists of a list of points to be observed in the class and space for ratings and comments. The factors are grouped into five major headings: the classroom, the instructor, the students, the lesson, and summary, with appropriate subdivisions under each one. The ratings to be given are superior, excellent, good, fair, and unsatisfactory, each corresponding to a number from 4 down to zero. For some situations the items to be checked may be varied to emphasize other points. The

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BASIS OF RATING:

4—Superior
3—Excellent
2—Good
1—Fair
0—Unsatisfactory

Name of instructor _____

Name of observer _____

Lesson title _____

Date _____ Time _____

	RATING		REMARKS
Classroom		LOCATION: in terms of available facilities	
		APPEARANCE: cleanliness, orderliness	
		LIGHTING, VENTILATION, SEATING	
Instructor		APPEARANCE: military bearing, neatness	
		PHYSICAL VITALITY: energy, enthusiasm	
		ATTITUDE: toward students	
		VOICE AND SPEECH: clarity, forcefulness	
		BODILY CONTROL: movements, gestures, mannerisms	
Students		APPEARANCE: neatness, bearing	
		ATTITUDE: attention, interest	
The Lesson		PREPARATION: adequacy	
		PRESENTATION — INTRODUCTION: clarity, completeness	
		PRESENTATION — EXPLANATION: effectiveness	
		PRESENTATION—DEMONSTRATION: effectiveness	
		APPLICATION: proper use	
		EXAMINATION: validity, comprehensiveness	
		DISCUSSION AND CRITIQUE: completeness of summary	
		TRAINING AIDS: preparation, use	
		STUDENT PARTICIPATION	
Summary		EFFECTIVENESS OF LESSON	
		MAJOR STRENGTHS	
		MAJOR WEAKNESSES	

FIGURE 62.—Rating form for observation of instruction.

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rating form, however, should be suitable for both indoor and out-of-door instruction.

(2) *Using the rating form.*—A supervisor, on visiting a class, will first get the "feel" of the entire situation, then begin analyzing the details, and finally, will summarize his judgments of the instruction. The rating form is designed for use in the second and third steps. The major details of the class are listed, and all which apply to the class situation are to be rated by the observer. He will also add comments to support and clarify the rating which he has assigned to each item. In case additional comments are necessary, further remarks may be made on the other side of the rating form. A rating should be assigned to the lesson as a whole, and comments made on the major weaknesses and strengths which were observed.

(3) *Cautions on use of rating form.*—All points of the rating scale should be used and the numerical ratings clarified by comments. (See par. 98.)

(*a*) There is a tendency for some supervisors to give few superior or excellent ratings; such ratings should be used whenever deserved.

(*b*) Numerical ratings do not indicate why a particular rating was given. In order to assist the instructor in improving his work, the supervisor must indicate why he rates certain factors as fair, or excellent, or unsatisfactory.

(4) *Advantages of a rating form.*—(*a*) The chief advantage of a rating form is that all factors are considered. The supervisor is reminded of each factor that enters into a total classroom situation and has his attention directed toward each in turn. The use of this form will prevent slipshod supervision.

(*b*) The ratings of different instructors are comparable. By referring all ratings to the rating scale, the observer will give a fairer judgment than would otherwise be the case. Every rating is made in relation to the same aspects of the class situation, so that the supervisor's rating on one point tends to be independent of the rating on the other points.

c. Supervisor's reports.—The supervisor should realize that the results of his observation are a check on his own performance as well as on that of his instructor. He should develop and maintain a comprehensive view of the entire training situation in order to direct his instructional program. His rating form and supervision notes should show that he is aware of all important problems, obstacles, and procedures. If the reports of the observations of the various officers in charge are sent regularly to the commanding officer, the quality and effectiveness of such supervision will increase.

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136. Procedures in observing classes.—Certain courtesies must be observed by the supervisor in visiting a class. The fact that he is there *to observe the class* and not to draw attention to himself should dictate his actions.

a. He will keep his scheduled visits unannounced.—The supervisor should inspect a class when he is least expected if he is to observe the instruction as it is routinely done. There should be no regular schedule, and no instructor should be informed that he will be visited at any particular class.

b. He will enter the class inconspicuously.—If the class is meeting indoors, he will enter quietly at the rear of the room whenever possible, and will demand no recognition from the students or the instructor. The instructor is not to call the class to attention nor break his presentation. In the the field, the observer will approach the class from a direction that will be least likely to distract student attention. The supervisor should do everything he can to keep the instructional situation exactly as it was when he arrived. That is what he wants to observe, not the effect of his presence on the instructor and the men.

c. He will get the "feel" of the whole situation before analyzing the details.—In the words of the proverb, the supervisor should "See the forest before looking at the trees."

(1) What general effect does the class give?

(2) Does the class seem to be "moving" in an orderly fashion or is there lack of coordination?

(3) Are the points presented logically and clearly?

d. He will study the specific aspects of the class.—After getting the feel of the classroom situation, the supervisor should analyze it for the details. In observing a class, the officer in charge should avoid attaching too much importance to any one detail. There is a tendency for some officers to insist on elaborate, detailed procedures which have little or no relation to effective teaching. No officer in charge should expect every instructor to teach exactly the way he does. In supervising, the officer should notice all points listed in figure 62.

e. He will appraise the total situation.—At the end of the observation, the supervisor should evaluate the instruction carefully, noting the major merits and weaknesses and appraising each in terms of the entire class procedure. Student reaction is an important cue to the effiectiveness of the lesson.

(1) The supervisor can stand near the students during the break period and appear to be busy at some activity not related to the students. By listening carefully to their comments and criticisms he can secure leads as to the effectiveness of the instruction.

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(2) By watching the attitudes of the students during the break period, by determining whether they appear to be alert and interested in their training or whether they are simply going through a routine, the supervisor can secure evidence of the degree to which the instructor has sold his subjects to his students.

(3) In terms of student reactions, the classroom appearance, the instructor's performance, and the results of the application and examination stages, the supervisor can determine—

(*a*) Whether or not the objective of the lesson has been achieved.

(*b*) The strong points of the lesson.

(*c*) The weak points of the presentation.

(*d*) The reasons for the ineffectiveness of any stage of instruction.

f. In general he will refrain from taking part in the class activities.—Whatever remarks the supervisor wishes to make, he will save till the end of the class period, make at some point in the discussion which will not embarrass the instructor, or take up in a private conference with the instructor after class. (See par. 30, FM 21–5.)

(1) If his instructors are well trained and qualified to teach the subject, any mistake in procedure or in an explanation will be minor. Any necessary corrections of such points can be made after the lesson. The instructor can then make the required explanation at the next class without lowering his prestige with his students.

(2) If his instructors are new or not so capable as they should be, the supervisor may find it necessary to add a comment or to modify an explanation to prevent the students from learning a wrong procedure or an incorrect idea. In making such corrections, the supervisor should start with a parallel situation, saying, "There are a few additional points that I would like to bring out," and then proceed to clarify the explanation. He should be certain that the explanation gives the students the desired point of view and does not confuse them.

(3) *A supervisor should never reprimand an instructor before his men.* Under no circumstances should he take over the class in the middle of a discussion, tell the instructor he was wrong, present a few points, and then turn the class back to the instructor. Any of these procedures has a disastrous effect on the morale and assurance of an instructor and causes the students to lose confidence in him. If the work of the instructor is so unsatisfactory that he cannot be allowed to teach the class, he should be given another assignment. A supervisor who finds the work of his instructors unsatisfactory is acknowledging his failure to select and train his instructors properly.

g. He will keep a record of his observations.—Because of the shortness of the observation period and the number of classes that must be

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checked on, the supervisor would note, in his brief daily visits, only the more obvious matters which demand special attention. In the case of the supervision of an entire class period, the officer in charge should keep a more complete record of his observation.

(1) An officer in charge will not be able to remember all the important points of the class he has observed for use in later discussions with the instructor unless he keeps a record of his observations.

(2) Keeping records gives the supervisor a more comprehensive analysis and understanding of the class than he would otherwise have.

(3) It enables him to keep a record of the progress of an instructor. By checking the records made over a period of time, he can secure a comprehensive evaluation of each instructor: his use of teaching aids, his persistent errors, those which he has corrected, the general progress, or lack of it, that he has made.

SECTION V

IMPROVING INSTRUCTION

	Paragraph
General	137
Conducting group conferences	138
Working with individual instructors	139
Refresher courses	140
Observing classes	141

137. General.—The officer in charge can improve instruction by utilizing properly the personnel and facilities and by trying out new ideas and techniques. The supervisor must work through the instructors in improving teaching. He can do this by individual and group conferences, by providing refresher courses, and by instituting observation of classes by the instructors themselves.

138. Conducting group conferences.—Group conferences should cover constructive criticisms of the instructional program, plans for new procedures and techniques, and suggestions of the instructors regarding their assignments. Regular meetings of the instructional staff provide a means of coordinating the instruction in all phases of training. Whenever a number of instructors are troubled by the same problems, such meetings provide an opportunity to consider possible solutions. A group conference can also be used to introduce new procedures or to clarify interpretations of changes of policy. These meetings can be informal, and the instructors should participate actively.

139. Working with individual instructors.—All instructors benefit from individual conferences and help. Some instructors—those who are teaching for the first time, those who are in a new situa-

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tion, and those whose work is not entirely satisfactory—will need more guidance than others.

a. All instructors.—An individual conference with an instructor should be held as soon as possible after the supervisor has made an extended observation of his teaching. The shorter the time lapse the more accurate and effective will be the supervisor's comments. The discussion should inform the instructor of the strong and weak points of his lesson and should make clear how he is to improve his work. Both instructor and supervisor should take an active part.

(1) The *instructor* should analyze his instruction and make suggestions for improvement. Self-criticism by the instructor has the two-fold advantage of emphasizing self-analysis and of developing a readiness to accept criticism. An instructor who is aware of his own weaknesses is in a position to improve his work.

(2) The *supervisor* in criticizing the lesson and suggesting improvements should—

(*a*) Be specific.

(*b*) Be certain that his criticisms are understood.

(*c*) Allow the instructor to present his point of view.

(*d*) Suggest means of overcoming the weaknesses.

(*e*) Make all criticisms impersonal and straightforward.

b. New or inexperienced instructors.—(1) Hold a conference with these men before they start teaching to assign them their teaching duties and responsibilities, to inform them of the special conditions and requirements in the new instructional situation, and to estimate their abilities and aptitudes.

(2) Check their lesson plans before classes. This insures adequate preparation by the new instructors and gives the officer in charge an opportunity to adjust their preparation to the training situation. Such checks should be made until the instructors demonstrate their ability to plan lessons properly.

(3) Have the new instructor rehearse his lesson. This "dry run" will enable the supervisor to detect any mistakes in the content of the lesson, offer suggestions as to ways of simplifying the presentation and emphasizing the important points, and indicate the procedures to be used in each stage of instruction.

(4) Observe classes frequently.

(5) Hold conference following observation. In this conference the supervisor will point out needed changes in procedure and increase the instructor's self-confidence by indicating the desirable aspects of the lesson.

c. Inefficient instructors.—The officer in charge of training who has an inefficient instructor on his staff should use the same general pro-

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cedure that he uses in breaking in a new instructor. Every instructor should be given an opportunity to improve through careful and thorough supervision. Patience and understanding are necessary, but the results of poor instruction are too drastic to permit retention of an instructor who consistently fails in his teaching. If the instructor fails to improve after several conferences, he should be assigned to duties more suited to his abilities.

140. Refresher courses.—*a.* Short refresher courses covering both subject matter and teaching methods are of value in a teacher training program. An instructor, as a result of specialization or a change of assignment, may not be entirely familiar with all aspects of the subject he is teaching. It is the responsibility of the officer in charge to be alert to the necessity for setting up needed refresher courses.

b. A review of the subject matter to be taught insures greater mastery on the part of the instructor. New developments in a field or changes in approved procedures can be presented to the instructors in this way. Such courses insure greater uniformity and prevent inaccurate instruction.

c. Instructional procedure training is of particular value for new or poorly qualified instructors. There are few instructors, however, who will not profit from an occasional review of teaching methods and a discussion of the solution of common problems of instruction.

141. Observing classes.—*a.* Another effective method of improving instruction is requiring each instructor to visit and observe critically the works of other staff instructors. The benefits from this include improvement in the work of the instructor who is being observed as well as of the instructors who are doing the observing. An instructor who visits and observes the classes conducted by other instructors becomes aware of procedures other than the ones he has been using. It is especially important that those instructors whose work is not entirely satisfactory be required to make such observations and to report to the officer in charge the results of such visits.

b. The outstanding instructors of the organization should be informed that their classes are being used as models. Such recognition is one of the rewards for exceptional instruction, and their techniques and procedures are thus made available to the less capable instructors. The outstanding instructors are also the ones who should try out new procedures and techniques that are being considered for use in the training program, for their suggestions will be of value in appraising the effects of possible changes of instructional procedures.

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SECTION VI

PROBLEMS OF SUPERVISION

Paragraph
Overcoming obstacles 142
Evaluating instructor performance 143

142. Overcoming obstacles.—*a.* Paragraph 24, FM 21–5, states that one of the most important duties of each commander is to remove obstacles to training.

b. Administrative obstacles can best be overcome by careful scheduling of the hours of instruction and by provision for special instructional devices. (See par. 24*a*, FM 21–5.)

(1) The requirements for guard, fatigue, and company details might be met by assigning an entire section or class to such duties. The rotation of such details by groups can be readily scheduled and administered. This plan eliminates problems arising from students' missing different classes.

(2) A mimeographed outline of the basic materials of a subject, with the references for each job assignment and lesson, will enable students who are absent part time to cover the important points outside the class situation. These instructional materials will also increase student interest and instructional efficiency.

(3) Study halls in charge of qualified instructors should be provided for slow students and for students absent from class. Each unit or school should provide a library of all War Department publications relating to the separate subjects in the various courses for use in such study halls as well as for the commissioned and noncommissioned officers.

(4) The officer in charge of training must make certain that each instructor has sufficient time to prepare his lessons adequately.

c. Physical obstacles are those of weather, terrain, and facilities. (See par. 24*b*, FM 21–5.)

(1) The training program should include provisions for continuing training in case of inclement weather. The use of applicatory exercises in bad weather is not desirable at some stages of training. Training films pertinent to the subject may be used when the space available does not permit the carrying out of the scheduled program. Every training program should be planned to provide emergency training of this type. There is no excuse for an instructor's saying, "What shall I do today? It is raining too hard to take the men out to the area. I guess I'll have to read the Articles of War again." It is the responsibility of the supervisor to see that plans for such obvious factors affecting training have been made.

(2) The procurement and utilization of all training expedients are the responsibility of the officer in charge. He should be alert to the

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possibilities of visual aids and familiar with the available films and film strips. He should assist his instructors in setting up charts, models, equipment, etc., and be on the alert for new aids or ways of improving the use of these expedients. The supervisor has an opportunity to judge the effectiveness of instructional techniques more accurately than the instructor since, as one of the audience, the supervisor is watching the instructor as well as the students.

(3) The effective use of terrain requires the coordination of all activities within the area. It is the duty of the supervisor to check each instructional situation for the possibility of improvements as to location, realism, and effectiveness of demonstration and application.

d. Human obstacles include the officers in charge, the instructors, and the students.

(1) Each supervisor must be alert to the possibility that his own interests and experiences, or those of his instructors, do not influence adversely the conduct of training. Racial prejudice, religious or political convictions, opinions about any arm, service, or component of the Army, Navy, or Marine Corps, or biases relating to the emphasis to be given to phases of training must be eliminated. A well-balanced program aimed at developing teams and individuals capable of handling *all* problems arising in the field must be secured.

(2) Personnel available as instructors is frequently limited. But such limitations are not excuses for a failure to utilize the men available. Careful selection and training will, in most cases, provide each commander with an adequate staff. (See secs. II and III for procedures to be used in selecting and training instructors.)

(3) Student difficulties are largely those arising from lack of interest, from emotional maladjustment, or from individual differences in ability. The supervisor who is aware of the importance of planning instruction to overcome these obstacles will be able to remedy an instructional or administrative situation which is harmful to effective learning. (See secs. I and VII, ch. 3.)

143. Evaluating instructor performance.—Observation of instructors in a class situation or training area is the most readily available means of evaluating their performance. Evaluation of the effectiveness of an instructor's presentation requires more than the observation of class instruction, however. Each officer in charge of a phase of training should maintain records of the progress of students, the number and type of complaints he receives, the extent to which each instructor utilizes training aids, and the suggestions made by instructors for improving instruction. These records will enable the supervisor to direct his efforts most efficiently, for he will then know the strengths and weaknesses of his training situation.

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CHAPTER 8

TRAINING AIDS

		Paragraphs
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II.	Actual objects	147
III.	Models	148–150
IV.	Maps	151–155
V.	Charts	156–158
VI.	Posters, cartoons, and illustrations	159–163
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SECTION I

GENERAL

	Paragraph
Definition	144
Use of training aids	145
Procurement of available training aids	146

144. Definition.—Training aids include actual objects, models, sand tables, training films, film strips, lantern slides, sound equipment, photographs, maps, charts, posters, cartoons, and illustrations used in instruction. (See pars. 77–84 and 87, FM 21–5, FM 21–6, FM 21–7, and FS 7–75.)

145. Use of training aids.—No lesson is complete without training aids; they add interest and vitalize learning in any class situation. As discussed in paragraph 24, the objective or purpose of the lesson is the major consideration in their selection. Each type has advantages and limitations and can serve some purposes better than others. But many of them should be used in combinations. For example, in giving instruction in tactical problems, a demonstration with troops is probably the best aid to teaching because of the similarity to combat conditions. Troop demonstrations, however, are not easy to stage, are time-consuming, and seldom give every student an understanding

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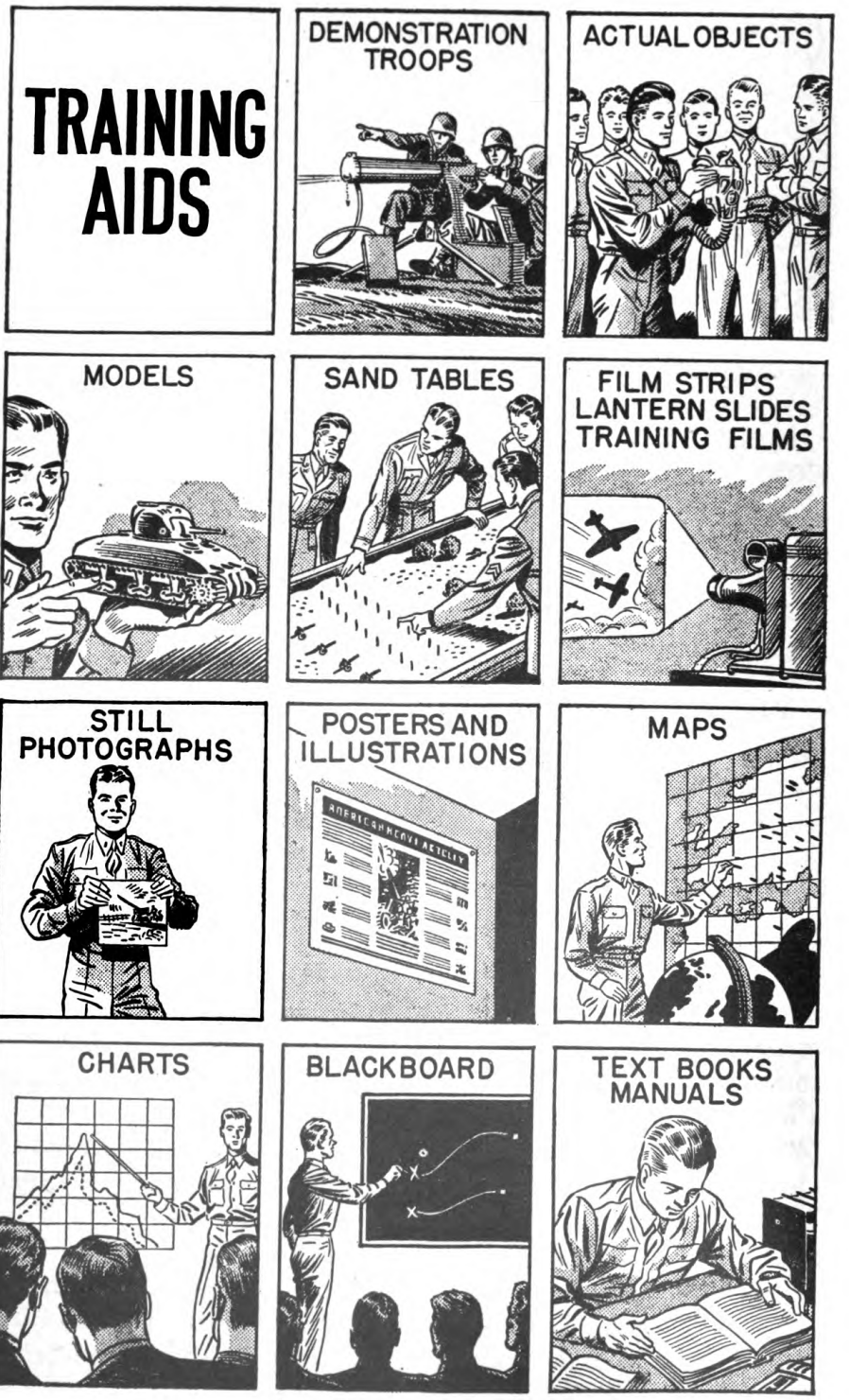


FIGURE 63.—Training aids.

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of the entire operation. Training films, therefore, may be used to supplement or take the place of troop demonstrations. Significant, large-scale maneuvers can be photographed from a vantage point by means of a telephoto lens, and through the motion picture can often be seen more satisfactorily by all the students than if they were on the demonstration ground. Long-range, panoramic shots can be supplemented by close-ups so that students see small details in relation to the whole tactical plan. For lengthy considerations of complex phases of maneuvers, film strips can be projected, explained, and discussed. Models, maps, posters, cartoons, and other training aids can serve other specific teaching purposes.

146. Procurement of available training aids.—*a. Responsibility.*—The commander is charged with responsibility for planning and executing the training program to achieve the objective of combat success efficiently. The procurement and development of training aids for the instructional staff are part of this assignment.

b. Procedures.—Because of the complexity of procuring and developing training aids and the specialization which this work demands, the training program will be expedited if this phase is centralized under the direction of a qualified officer and staff.

(1) An organization charged with training functions should have an officer experienced in the teaching procedures used in the Army and civilian institutions designated as the training aids officer. His duties follow:

(*a*) To make available to the instructional staff complete lists of all training aids accessible in the organization or procurable from other sources.

(*b*) To assist the officers in charge of each training unit in the scheduling of such aids.

(*c*) To supervise the production of any training aids that must be developed.

(*d*) To indicate training aids that will be of value in the instructional program, the ways in which they can be used, and the procedures necessary to train the instructors in the proper use of these aids.

(2) The officer should be assisted where feasible by a staff which includes specialists in the use and development of training films, film strips, lantern slides, and in the production of maps, charts, models, and other training devices.

(*a*) In service or troop schools, men having previous training and experience as architects, artists, or draftsmen can be assigned to such activities when it does not interfere with their basic training, and made a part of the headquarters detachment.

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(*b*) In newly activated units in which a single continuous training program is being conducted, personnel having qualifications similar to those indicated for the staff listed above can be assigned to special details for the development of training aids.

(3) The officer in charge will coordinate the activities relating to the development and procurement of training aids, assisted by—

(*a*) The signal property officer who is charged with the preparation, distribution, and storage of photographic training aids.

(*b*) Personnel assigned by the various units for the construction of special training expedients as models, sand tables, and the like.

c. Instructor's responsibility.—It is the responsibility of each instructor, well in advance of teaching any lesson, to—

(1) Study the lesson plan and decide which training aids he will need.

(2) Submit the list to the officer in charge, who will work through the training aids officer.

(3) Make certain that the aids needed will be available and ready for class use.

(4) Render any additional assistance in line with his duties.

SECTION II

ACTUAL OBJECTS

Paragraph
Uses and types 147

147. Uses and types.—*a.* Actual objects are so widely used in Army training programs that little comment is necessary. Their use has been discussed in paragraph 24, and it is necessary only to repeat that actual objects—tanks, motor vehicles, rifles, mortars, gas masks, switchboards—bring vivid reality to the training program and intensify learning to a marked degree. All other training aids are either substitutes for or supplementary to the use of actual objects.

b. Other training aids, however, used in combination with actual objects, will frequently speed the students' understanding of how the object functions. For example, the sectional model of a clutch mechanism shown in figure 21, mounted on a vertical board and with the different parts clearly differentiated by color, can be used to explain the operating principles of this mechanism to a larger group of students more rapidly than would be possible if *only* the actual object were shown. Similarly, the models shown in figures 59 and 65 enable the students to learn tactical principles more economically than they could if all their time were spent on the actual terrain. The important point to remember is: *no single type of training aid is sufficient for the great majority of lessons.*

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SECTION III

MODELS

	Paragraph
Uses and types	148
Characteristics of effective models	149
Making models	150

148. Uses and types.—Models are used for a variety of purposes, among which the following are most important:

a. To substitute for actual objects which are difficult to procure or to use in the teaching situation.

b. To explain the operating principles of a complex mechanism. A large-scale model or one with cutaway parts shows the parts and

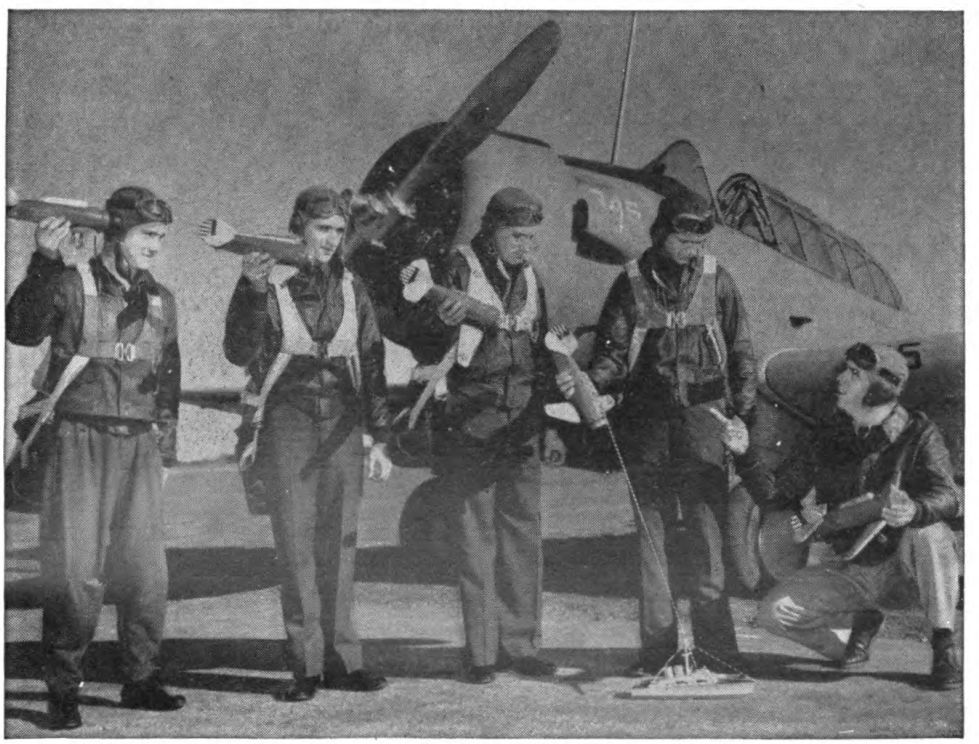


FIGURE 64.—Dive bombing with model airplanes.

movements ordinarily hidden from view in the actual object. Figure 32, an enlarged working model of a teletype machine unit, reveals details with a clarity impossible to achieve by using only the actual object.

c. To give an over-view of an operation, structure, or process. For this purpose, reduced scale models are generally used. A sand table or model (see fig. 59) enables students to see the whole plan of tactical operations and gives them an appreciation of each combat unit's part

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in the exercise. Likewise, figure 69 shows how students can learn some phases of the construction of barracks and the installation of the heating and plumbing systems more readily than they could from studying full-size, completed buildings.

d. To determine aptitude for learning or to give preliminary practice in a skill. The model pictured in figure 51 is an improved form of the electric-eye gun often seen in shooting galleries. Simulating actual firing conditions, this device can be used to estimate students' aptitudes in gunnery and also affords an opportunity for soldiers to develop skill in marksmanship more economically than on the firing range. A further advantage is that a shooting gallery of this type can be used in any sort of weather. But it should be realized that such training expedients do not provide the necessary experience in changing sights, extension of distance, and adjustment to the recoil of the gun which can be secured only on a range.

149. Characteristics of effective models.—A model should be—

a. A convincing representation of the actual object.—A high degree of realism is essential in models, for inaccuracies will distract attention from what is to be learned. Considerable skill is necessary to produce a model satisfactorily realistic in operation, form, and color.

b. Of suitable size for teaching purposes.—All students should be able to see easily any training aid used in teaching. Thus, if a large class is to receive instruction in tactical operations, the model must be sufficiently large, as is the one shown in figure 59, so that all students will be able to follow the demonstration. On the other hand, small groups of students can readily see scale models such as are illustrated in figure 70.

c. Durable in construction.—If models are to be used many times by different instructors, they must be solidly constructed of durable materials. This is especially important if they are to be moved from one class to another.

d. Convenient to handle.—A few models can be permanently installed in classrooms, but this is the exception rather than the rule. Such models must be covered or otherwise hidden when not in use in order that they may not detract from attention of other classes. Consequently, when models are designed and built, considerable thought should be given to making them convenient to move.

150. Making models.—Skill, ingenuity, and imagination are requisites, not only in the actual construction of models, but in discovering those phases of teaching in which models could be used. Many models can be built from scrap materials ordinarily thrown away, while others may require special kinds of lumber, metal, etc.

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a. Sand tables.—Complete descriptions of how to build and use sand tables are presented in TF 7–265 and 7–266. (See also fig. 65.)

(1) *Equipment.*—The following materials and equipment are needed to build a sand table: 2-inch lumber for the box or tray; sand that can be molded when wet; shovel, rake, sprinkling can, large

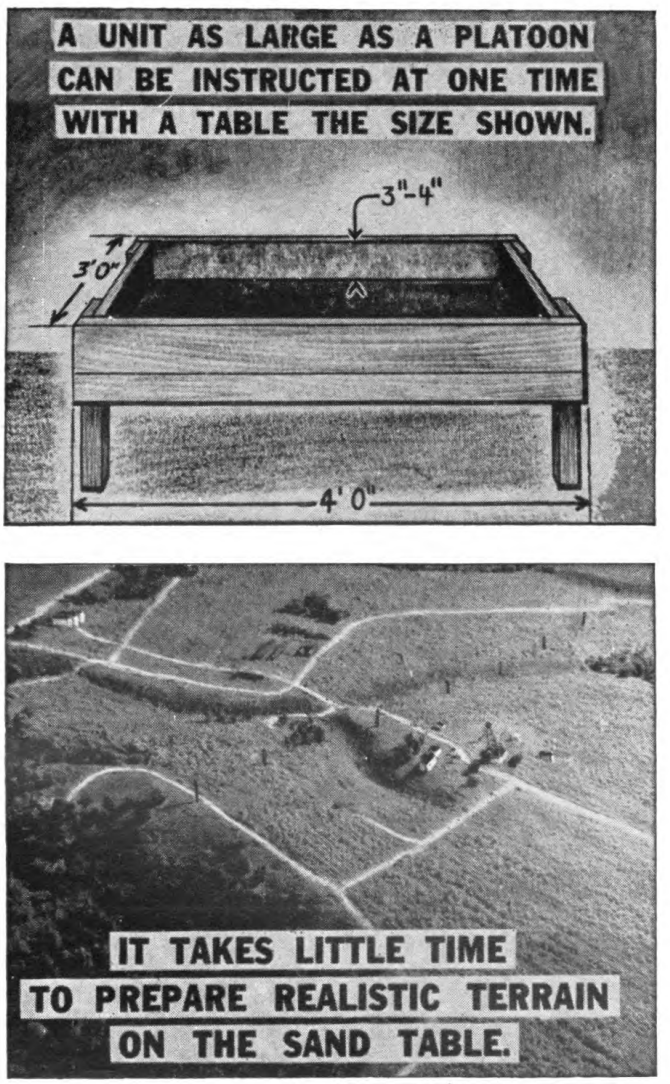


FIGURE 65.—Sand tables.

bucket of water, bucket for mixing sand and water; ruler, string, thumbtacks, blue and green chalk, wire sieve; assorted sizes of wooden blocks to represent buildings; and pieces of toy equipment, such as soldiers, trucks, tanks, tents, and guns.

(2) *Constructing the tray.*—The tray should be built of 2-inch lumber, and may vary in size according to special needs. A useful

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size for small problems is 4 feet long, 3 feet wide, and 10 inches deep; for large problems the table should be 5 by 10 feet or larger. The inside of the completed box should be tarred to prevent warping before the damp sand is put in.

(3) *Constructing the terrain.*—Suitable terrain is selected on a map which is divided into squares and numbered. (See par. 153*f*(1)). Similar squares are marked on the sand table by cords fastened at the proper intervals along the sides of the box. The important features, such as hills, valleys, streams, and roads are then molded in the sand. Woods can be represented by dropping handfuls of wet sand in the proper places and coloring these with powdered chalk or by using



FIGURE 66.—Arranging a topographic model.

painted pieces of sponge or paper. The buildings and military features can then be put in position.

b. Topographic models (see figs. 59, 65, 66, 67).—The first step is to secure an accurate, detailed map of the area to be represented in the model.

(1) *Base.*—Topographic models should be constructed on a solid wooden frame or box of the desired size and sufficiently strong to support the model.

(2) *Topographic features.*—The hills, valleys, and other ground formations can be built up in several ways. Many of the suggestions for constructing a sand table apply equally well to making a model.

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(*a*) Plasticene, water clay, or sand can be modeled to conform with the contours of the topography as shown on the map.

(*b*) Heavy cardboard, wallboard, or plywood sections can be cut to conform with the contours on the map. The material selected should be of such thickness that it will be equal to a definite unit of elevation at the scale on which the model is built; for example, plywood ¼-inch thick would represent an elevation difference of 10 feet if the vertical scale of the model where 1 inch equals 40 feet. Pieces

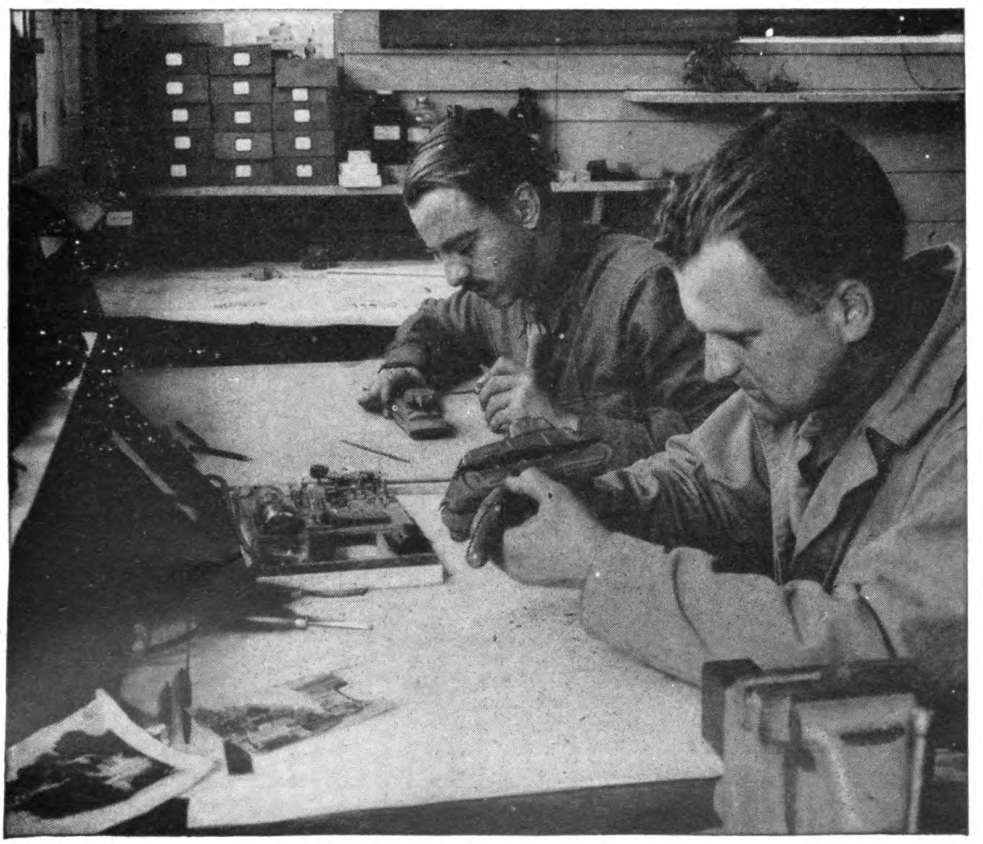


FIGURE 67.—Building tank models.

of plywood (or cardboard) corresponding exactly to the shape of each contour should then be cut, and when assembled in the same pattern they form on the map, will give a true representation of the actual ground shapes. Clay or wet sand can be spread over this foundation to give the smooth effect of the ground forms.

(3) *Buildings, bridges, etc.*—These can be constructed from thin wood, wallboard, cardboard, or clay to represent the size and shape of the originals.

(4) *Woods.*—Masses of trees can be fashioned from sponges, modeled clay, or any scrap materials. Pieces of cardboard or wood roughly

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shaped with a knife are very satisfactory. If the model is large-scale, the trunks and branches of the trees can be made by twisting together several strands of picture wire for the trunks, splitting and twisting the ends for the branches; or branches of shrubs that resemble tree trunks and limbs can be used. Steel wool or sponges can be cut in foliage shapes and fastened onto the branches. A more realistic effect is obtainable by spraying the foliage masses with shel-

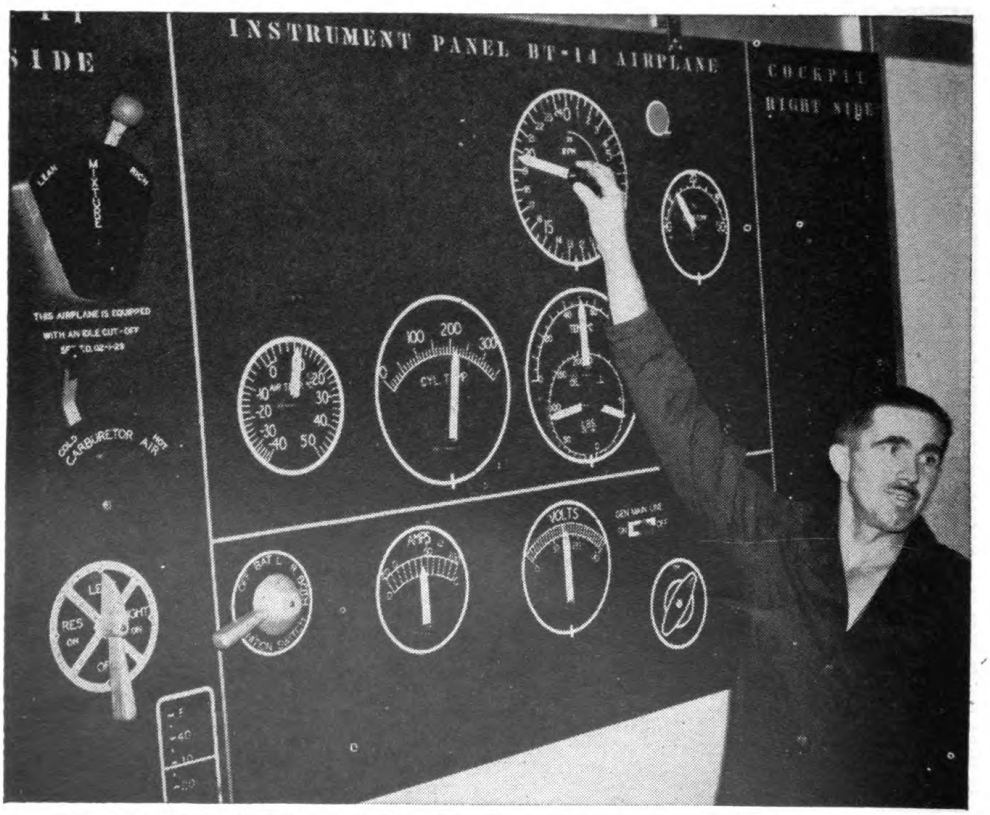


FIGURE 68.—Oversize instrument panel can be used to teach large groups.

lac, sprinkling them with sawdust, and spraying them with green paint.

(5) *Fields.*—Open fields can be readily simulated by roughening the surface of the clay, or by sprinkling it with sawdust, and then spraying it with suitable colors or coating it with chalk.

(6) *Water.*—Lakes and streams can be represented by covering the water areas with glass, or cellophane, or by painting the areas blue.

(7) *Tanks, motor vehicles, etc.*—It is frequently possible to purchase toy trucks and automobiles, such as those in figure 70, that are suitable for use in models. If such are not available, they can be constructed from wood, metal, rubber, and other material as shown in figure 67.

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c. Large-scale working models.—Examples of large-scale models are shown in figures 21 and 32. These can be made from wood, wallboard, metal, etc. Plywood is useful because it is thin, lightweight,

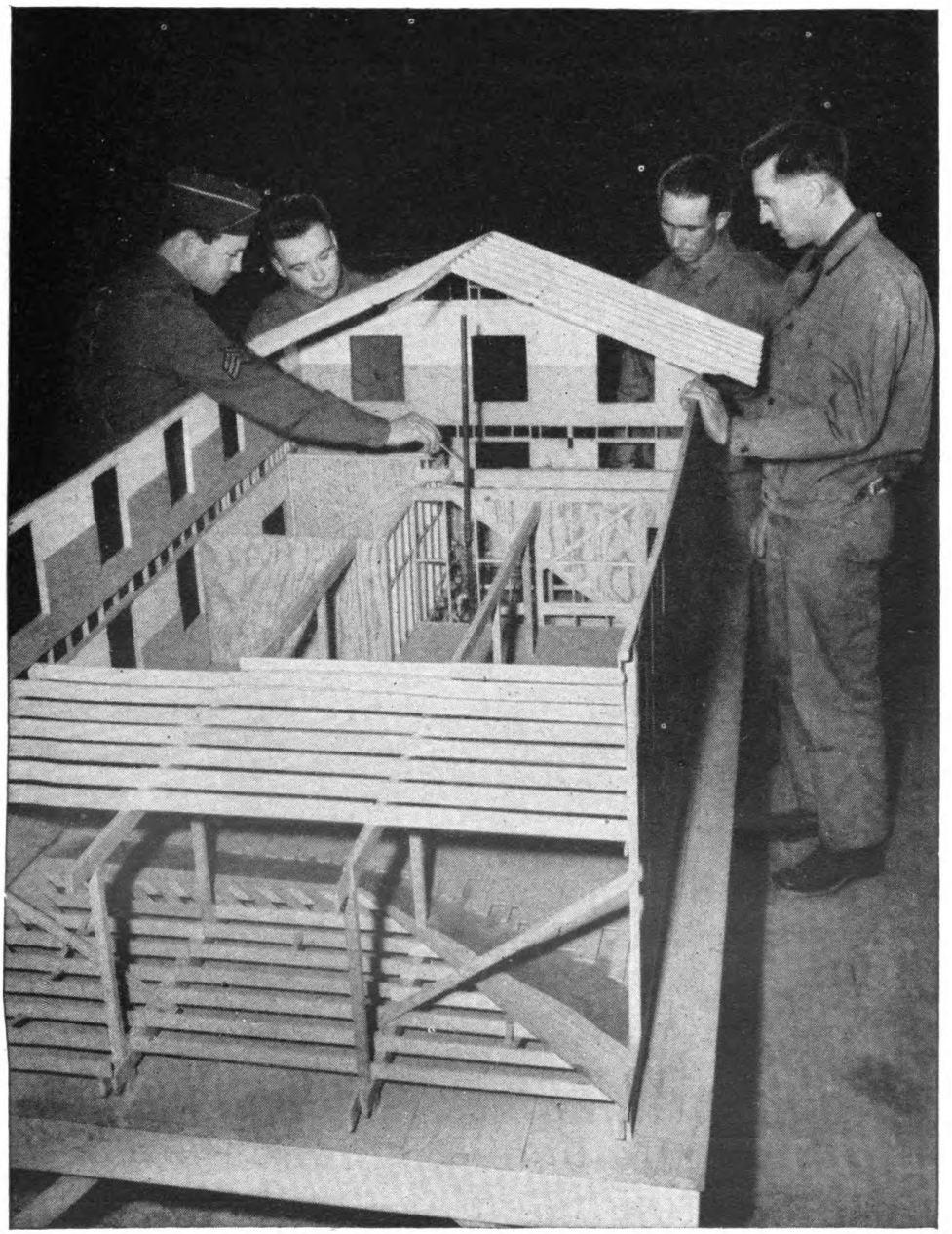


FIGURE 69.—Model barracks for training construction and utility personnel.

strong, and may be easily cut into complex shapes. Even more than in topographic models, accuracy and careful workmanship are essential in models that are to be used for demonstrating the operating

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principles of mechanisms. Because each type of working model involves special problems, no general suggestions can be made other than to repeat that skillful execution and accuracy are requisites.

d. Small-scale models.—To expedite instruction, it is frequently desirable to have reduced-scale models of such objects as buildings. Figure 69 shows a model of barracks, accurate in every detail, which

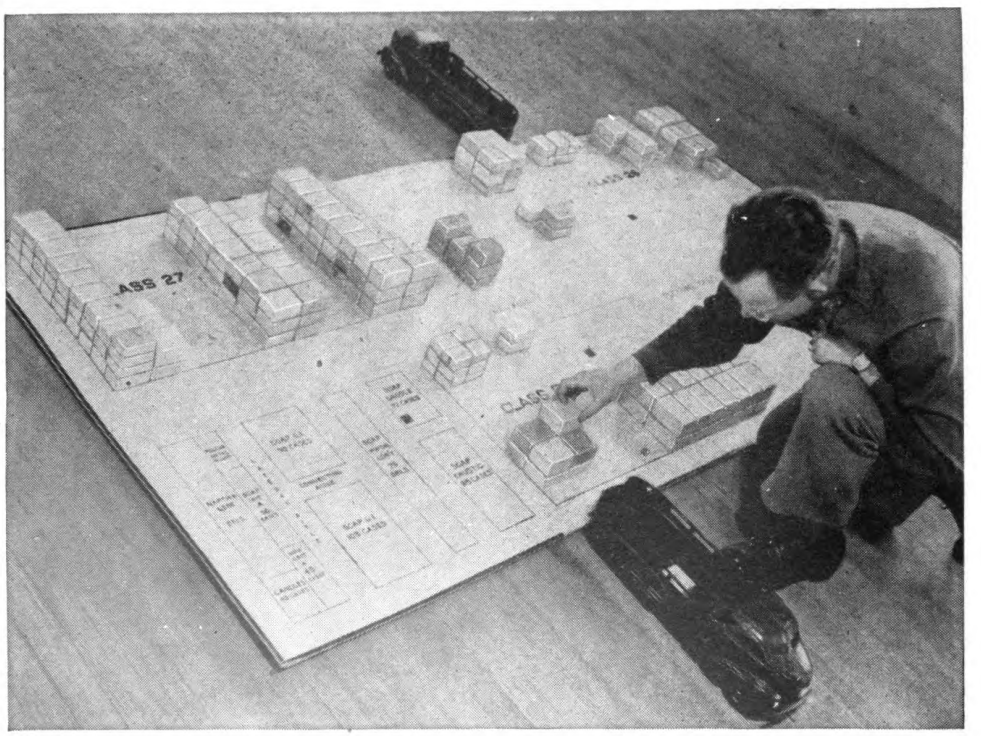


FIGURE 70.—Model trucks and warehouse for training supply personnel.

can be used both for instruction and for reference by soldiers going out on repair details. Figure 70 shows a model warehouse with trucks and supplies.

SECTION IV

MAPS

	Paragraph
Uses and types	151
Characteristics of effective maps	152
Preparing large maps	153
Equipment and materials for preparing maps	154
Reproducing small-size maps	155

151. Uses and types.—*a.* In military training, maps are essential to illustrate tactical and logistical principles, formations, and maneuvers (figs. 30, 54, 60, 71). The function of maps is to show areas

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and distances graphically and at reduced scale so that they can be readily understood. Thus, a map (or an aerial photograph) can represent the location and size of the important features of topography in a combat area and is essential in planning offensive and defensive tactics. (See pars. 110 and 112, FM 21–5.) Maps of small areas,

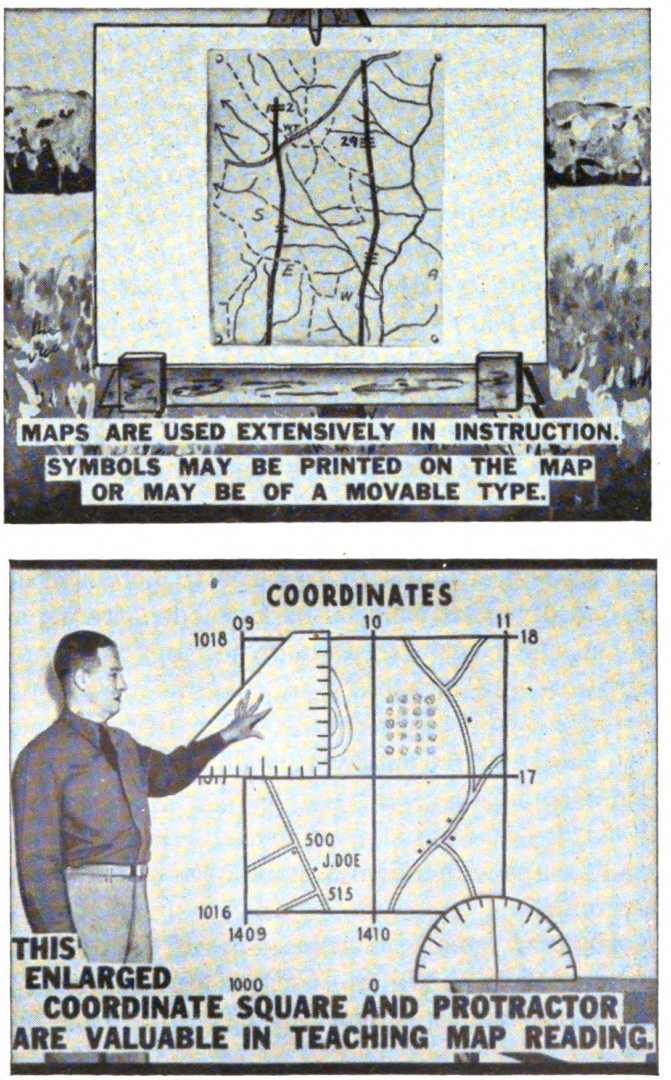


FIGURE 71.—Maps.

drawn at large scale, can show much detail: small ravines and hills, clumps of trees, buildings, and military installations. Distances, directions, and elevations can be quickly computed from an accurate map. With the rapid development of air transportation and warfare, maps of the entire world have become increasingly important. Maps of large areas—states, countries, or continents—are of neces-

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sity drawn at smaller scale, and can show only the important features, such as the location of cities, rivers, etc. Reading of maps is discussed in FM 21–25 and 21–26 and is presented visually in TF 5–12 and FS 5–1. The instructor using maps in his teaching should be familiar with these materials.

b. Displaying maps.—Maps (or charts) are usually hung on a bulletin board or on the front wall of the classroom. They should be securely fastened, placed squarely with the lines of the room, and well lighted. Other suggestions follow:

(1) *Swinging or sliding panels.*—Panels that swing on hinges, or slide in, facilitate the use of maps in the classroom. The panels may be made of wallboard or plywood.

(2) *Storage and presentation case.*—In using maps (or charts) in a class, it is convenient to have a box in which the maps can be kept, and which also has a frame to support them when they are presented. Although useful in a classroom, this device is of special value for classes held outdoors. The box should be a few inches wider and higher than the charts and deep enough to hold the required number. A suggested size is approximately 40 inches high, 30 inches wide, and 12 inches deep. Each map can be fastened to a wooden rod. The rods rest on two supports at each end of the box when they are put away. A wooden frame can be built to hold the charts while they are being used. This consists of a wooden frame, as wide and twice as high as the box, with two projecting arms on which the wooden rods rest.

c. Types of maps.—(1) *Wall maps.*—For instructional purposes, large maps can be drawn on paper or cardboard and displayed on the walls of the classroom.

(2) *Small maps.*—Individuals and small groups of students can make good use of maps which fit into notebooks or map cases, or which accompany manuals.

(3) *Maps projected from film strips.*—Many of the film strips prepared and distributed by the Signal Corps contain maps. For special needs it is possible to photograph, on film, maps drawn or printed in manuals.

(4) *Relief maps.*—Permanent three-dimensional maps can be constructed of wallboard, plasticene, and the like; or temporary ones can be modeled on sand tables.

(5) *Globes.*—Globes are the only accurate means of presenting the relative sizes and locations of large areas of the earth's surface. Although two-dimensional maps give an approximation of the land and

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sea areas, the distortion—particularly near the poles—is likely to lead to misconceptions of sizes and positions.

152. Characteristics of effective maps.—A map is judged at first sight by its general effect. It should be *simple*, with no unnecessary detail distracting attention from the essential features. It should be *visible* and *legible* even to those students farthest from it. It should be *accurate*, not in every minor detail such as the exact size of clumps of trees, but in the location and representation at a consistent scale of all important features (see par. 2, FM 21–35 and TM 5–230). Specifically, the following points should be observed in selecting or making a map for instructional purposes:

a. The *size* must be suitable for the class. Maps that are too small to be easily seen by the entire class should never be used for group instruction. Small maps can, however, be reproduced on lantern slides or projected with a delineascope.

b. The *detail* should be carefully selected. Only that which is essential to the purpose of the map should be included. It is well to remember that one map cannot serve a large number of needs, and that it is better to use different maps to illustrate different points than to crowd too much on one.

c. The *symbols and lettering* should be legible. The symbols representing trees, roads, houses, military posts or stations, radio stations, etc., should conform to those in FM 21–30. Because the appearance and usefulness of a map depend to a large extent on the lettering, care should be taken to see that it is legible and neat. (See pars. 19 and 20, TM 5–230.)

d. Color has been used to differentiate and emphasize divisions of area and topography since maps have first been made. In military maps, color also finds a place in making readily evident different types of military installations. If color is used, it should be strong enough to carry, but it should not be so bright or attractive that it takes attention away from essential features. Color can be applied in one of three ways: as *areas*, as *outlines*, or as *both*. Other methods to increase legibility by color differentiation are shading, grading of tones, color strips, and daubs. Although the primary purpose of color is to increase the legibility of the map, it should not be forgotten that color adds as much interest to a map as it does to an advertisement.

e. Maps should be drawn as *accurately* and *neatly* as the purpose demands. In some cases the highest degree of accuracy will be needed, while in others a rough sketch will suffice. In all cases, however, the map should be drawn with care and with attention to its appearance and design.

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153. Preparing large maps.—Preparing maps does not necessarily require artistic ability, but careful attention to a few simple rules will be worth while. The successive steps of procedure are listed below:

a. Make small pencil sketches of maps that will be useful in illustrating the lesson. These may be made with soft pencil on small pieces of paper.

b. Decide which type of map will best put across the ideas. Consider the possibilities of using charts, diagrams, or other visual aids.

c. Decide whether it is to be drawn in ink, crayon, or other medium.

d. Become familiar with drawing materials and equipment.

e. Decide on the size of map needed for the lesson.

f. Enlarge the small sketch to the required size by one of the following methods:

(1) *By proportional squares.*—(*a*) Divide the vertical dimension of the small sketch into eight equal spaces. This can be done by folding the vertical edge into halves, then quarters, and then eighths.

(*b*) With one of these spaces as a unit of measure, space off the horizontal dimensions.

(*c*) Rule vertical and horizontal lines from the points obtained from the procedures in (*a*) and (*b*) above, dividing the entire sketch into squares.

(*d*) Number these squares consecutively from left to right in the upper row, continuing in the same manner for the other seven rows.

(*e*) Fasten the required size paper on the drawing board or easel, leaving a margin of several inches on all sides. Wrapping paper can be readily procured and used, although drawing paper or cardboard will give much better results.

(*f*) Divide the paper into the same number of squares as on the small sketch, leaving a 2-inch margin on all sides. A simple way of putting the squares on the large paper is with a piece of twine a foot or so longer than the drawing. Rub a light-colored chalk over the twine until the latter is thoroughly covered with chalk dust. This is accomplished easily if the twine is held taut. Stretch the twine between the upper left mark and the upper right mark, and snap the cord against the paper as a carpenter does a chalk line. Thus the paper can be ruled accurately and easily. Continuing in this way, rule the entire paper into squares, numbering each to correspond with the squares on the small sketch.

(*g*) Transfer the features from each square on the small map to the correspondingly numbered squares on the enlarged map as described in *g* below.

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(2) *By projection.*—If an opaque projector or delineascope is available, much time can be saved and greater accuracy secured. By this device, the small sketch is projected directly onto the large paper. The distance between the projector and the paper must be adjusted until the image is the size wanted (see fig. 72). It is then necessary only to sketch in pencil what is to appear on the map or chart.



FIGURE 72.—Opaque projectors.

g. Transfer of features.—Usually the best method is to transfer in pencil, using the proper scale, all features to the enlargement, then block out spaces for lettering before commencing to ink. For conventional signs for terrain features see paragraph 22, TM 5–230. It is a good idea to ink in the names first, but the instructor who is not familiar with the use of his pens will profit by getting practice on

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terrain features before commencing to letter. A common error is to complete the terrain features first, then superimpose the names over the features. This results in lack of clarity and neatness. The names of towns or operations should be printed within cleared spaces so that a small white margin will be provided for each name. It may be necessary to use an arrow to indicate the exact location of the town or operation. However, it is good practice when a certain feature, such as a road net, is to be emphasized, to ink in this feature first so that all others can be subordinated to it. In any method of procedure make provision for spaces for names and reference data.

h. Reference data legend.—On instructional maps or charts certain data should be shown: the name of the operation, the date, a simple unit of measure or scale, and a direction line. Other details, such as the vertical interval in case of a contoured map, will be necessary. Such data may be placed in a separate, convenient place or in an unused area on the map. Often one corner can be set off for the legend. A border around the legend adds to the total appearance.

i. Inking in the features.—Colored inks may be used to plot the various features, in accordance with FM 21–30: black for man-made features—roads, towns, fences; brown for contouring or hachuring; blue for water; and green for vegetation. Red ink is issued principally for plotting troop dispositions. It is customary to use red, blue, and brown ink to designate troop dispositions when two or more units come in conflict.

j. Inking in names, reference data (see TM 5–230, pars. 19, 20, 21).—(1) Simple block letters are the easiest to make and read. Lower-case letters are used only on streams. Black is the conventional color; but where states or countries are bordered in color to bring out their boundaries, it is often effective to letter the name in the same color as the boundary.

(2) *Size of the lettering.*—For lecture rooms, lettering should not be smaller than 1½ inches in height. A letter under 1½ inches is difficult to see from the rear of most rooms. A 2½-inch letter is large. Lettering within this range can be used to emphasize the relative importance of the different features.

k. Allowing ink to dry.—Probably one of the greatest sources of annoyance is the smearing of undry ink. It is advisable to ink in one complete feature at a time, such as the road net, and let that dry thoroughly before putting in any other details. Often instructors lose much time in removing ink smears because they commence to erase pencil and chalk marks before the ink is dry.

l. Cleaning the enlargement.—The artgum eraser is used to remove pencil and chalk marks. In removing ink lines and smears, an

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ink eraser is often required, but white show-card color applied with a brush is much faster. However, re-lining or lettering cannot be done over show-card color.

m. Trimming the margin.—When a border is used, a margin of 2 to 3 inches is customarily left; this has the same effect as a frame on a picture.

n. Movable symbols.—It will often be necessary to show movement on a map, especially troop dispositions. By utilizing movable symbols which can be thumbtacked in proper place and moved as the situation develops, the student will follow the process in his mind. It is also effective to use movable arrows which can be tacked on a map to show points or locations which are under discussion. In short, with a little ingenuity, an instructor can bring life to an otherwise dull map by using movable symbols. (See figs. 30 and 71.)

154. Equipment and materials for preparing maps.—The following materials and equipment should be available in the visual aids section of every training center:

a. Drawing tables of the *proper height*, with *large*, *smooth tops* which can be *adjusted* to different angles.

b. Light table with glass top lighted from beneath.

c. Drawing boards.

d. Draftsman's stools and chairs.

e. T-squares, triangles, and engineer and architect scales.

f. Drawing instruments—compass and divider, ruling pens, etc. (See par. 9, TM 5–230.)

g. Ink—black, blue, brown, red, and green.

h. Broad point and "Speedball" pens.

i. Show card or poster paint—red, green, blue, yellow, black, and white.

j. Camels'-hair and bristle brushes.

k. Artgum, kneaded, and ink erasers.

l. Ball of strong twine.

m. Cake of carpenter's chalk.

This equipment is inexpensive when purchased ready-made, or some of it can be prepared in the carpenter shop. Time spent in getting the proper drawing equipment is time well used in increasing the efficiency of the total training program. Further information on the description and use of drawing equipment is found in sections II and III, TM 5–230.

155. Reproducing small-size maps.—It is often necessary to reproduce small-size maps (or charts, cartoons, and illustrations) in quantity for student or staff use. This can be done by one of several methods.

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a. Ditto.—The ditto method of reproducing drawings, maps, or typed materials is well suited to making a limited number of copies, generally from 20 to 100.

(1) *Equipment and materials.*—All the materials used are especially prepared for this process; ordinary supplies are not suitable.

(*a*) Especially prepared carbon paper.

(*b*) Special smooth paper for the copies.

(*c*) A gelatin pad, or a special printing machine similar to that used in the mimeograph process.

(2) *Method.*—(*a*) Material to be reproduced is traced or typed, special carbon paper being used.

(*b*) The copy prepared in step (*a*) is then either transferred to the gelatin pad or to the printing machine, and the copies are run off.

b. Mimeograph stencils.—Printed and drawn materials are widely reproduced in the Army by this process. The size is limited by the size of the stencils available.

(1) *Materials and equipment.*—(*a*) Mimeograph stencils.

(*b*) Light table. This is a piece of frosted glass, supported by a wooden frame or table, and lighted from beneath. If such equipment is not available, it can be constructed in the carpenter shop. For mimeograph work, the light table can be a simple wooden box, several inches larger than a mimeograph stencil, on which a piece of glass can be supported. An electric light bulb is placed underneath. Tracing will be expedited if the top of the frame holding the glass is at an angle of approximately 30°. If frosted glass is not obtainable, clear glass can be used, provided a frosted electric light bulb or a light baffle made from such materials as tracing paper is used.

(*c*) A mimeograph printing machine.

(2) *Method.*—(*a*) The drawing is placed on the glass *under* the stencil.

(*b*) The drawing is transferred to the stencil with a stylus.

(*c*) Many kinds of textures, in addition to lines, can be put on the stencil.

c. Photochemical stencils.—Complex maps, as well as mechanical drawings, diagrams, and illustrations, can be reproduced directly from ink drawings by means of photochemical stencils. This process saves considerable time and gives superior reproductions. The chief disadvantage is that special equipment, not available in many training centers, is necessary. The process requires considerable skill, and the detailed directions published by the manufacturers of the materials should be read and followed.

(1) *Materials and equipment.*—(*a*) Photochemical stencils.

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(*b*) Sensitizing fluids, diluents, brushes, etc.

(*c*) Equipment for exposing the stencil.

(*d*) Mimeograph printing apparatus.

(2) *Method.*—(*a*) A clear, sharp drawing in India ink should be prepared on tracing paper, tracing cloth, or blue-white bond paper.

(*b*) The stencil is sensitized.

(*c*) The sensitized stencil is exposed with the drawing in place, developed, and dried.

(*d*) The stencil is printed on a mimeograph machine.

SECTION V

CHARTS

	Paragraph
Types and uses	156
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156. Types and uses.—Charts are visual representations of facts, situations, or objects for making comparisons, for summarizing, or for showing quantities and developments. They may be drawn either on paper, wall board, or a blackboard (see FM 21–5, par. 82). Ideally the drawings should express the thought so clearly that few words or figures are necessary. For many phases of military instruction, charts are the best or, in some instances, the only way of presenting subject matter (see fig. 73). Charts and diagrams of enlarged details or sections of complex mechanisms frequently tell the story far more vividly than the actual object (see figs. 4 and 73; and figs. 13, 14, 28, etc., FM 21–100). To focus attention on one important point at a time, charts are frequently covered with strips of paper so arranged that at the appropriate time in the lesson the instructor can remove one strip of paper, thereby exposing the pertinent point. The use of such "strip-tease" charts is well demonstrated in TF 7–295. Whenever possible, it is advisable to use diagrammatic charts together with the actual objects they represent. To choose the type of chart that will best present the idea, the instructor must know exactly what the chart is to show and be familiar with the different possibilities of portraying it. Temporary charts may be drawn by the instructor on a blackboard. (See par. 44 and fig. 29 for technique of constructing and using a blackboard.) The most common types of charts are discussed below:

a. Tables.—A good example of the tabular type of chart is the railroad timetable, showing as it does a great many facts in orderly form. The right half of figure 74 shows a table in which rifle marks-

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manship scores are recorded. Tables are also used extensively in the Army in many kinds of numerical and statistical tabulations.

b. Organization and flow charts.—This type of chart is generally used to show how the parts of an organization are related to one another. For example, the most effective way of clarifying the ad-

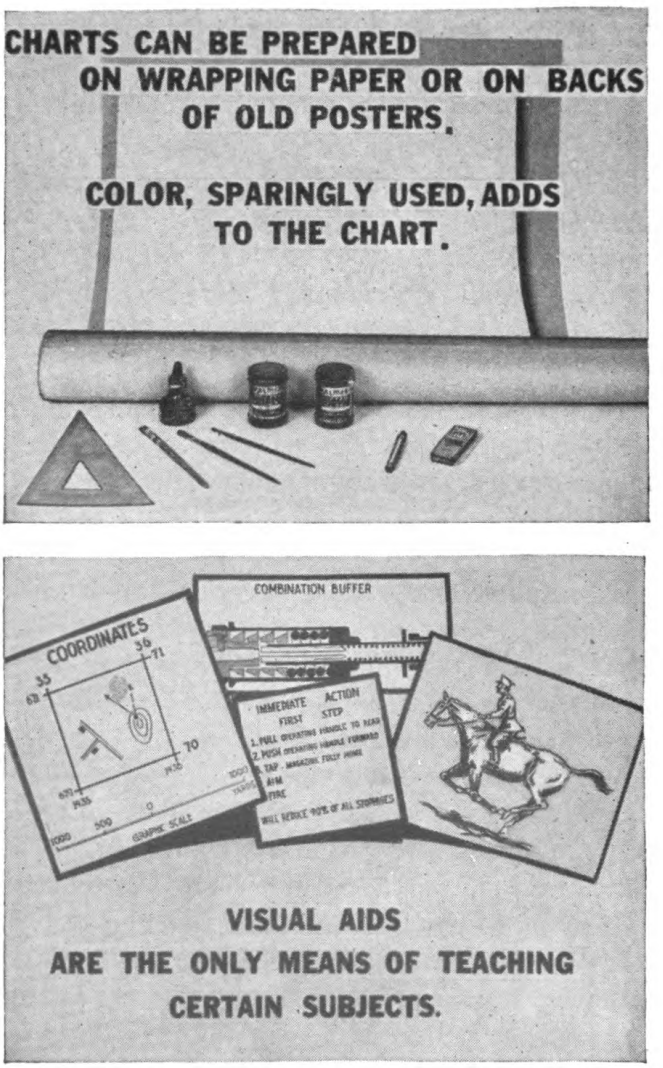


FIGURE 73.—Charts.

ministrative organization of the Army and its branches is by means of a chart showing the flow of command from the Commander in Chief through the Secretary of War and Chief of Staff down to the lower echelons. Flow charts also can show in sequence the steps in a process as in figure 3.

c. Bar charts.—The bar chart gives a visual comparison of quantities which are represented as a series of bars of different lengths in

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proportion to the quantities they represent. The bars may be placed either vertically or horizontally, beginning at a common line as zero. Comparisons may be made at a glance by comparing the relative positions of the ends of the bars. Its great value lies in its simplicity.

d. Area diagrams.—Area diagrams are used to show relative quantities by means of differences in the size of areas representing the quantities. The two chief types are the circle or pie chart and the area figure.

(1) *Pie chart* (see fig. 7).—The pie chart is a circle, the arc of which is divided radially according to the percentage division of the whole circle. Its visual value lies in its simplicity and unity; its teaching value, in the manner in which it shows the relation of the

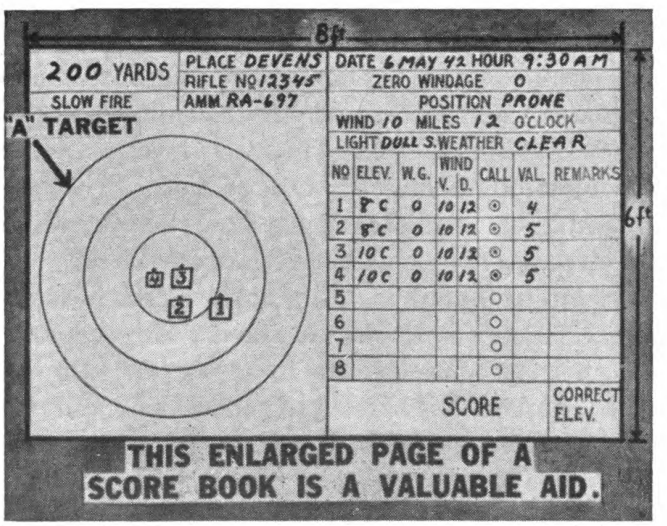


FIGURE 74.—Score book.

quantities of parts to the sum of the whole. Thus, it is a good way of showing how a day, week, or other time period in a training program is divided. Its chief limitation is that actual quantities are seldom made meaningful, the proportional rather than the actual amounts being conveyed. The segments of the pie chart become much more meaningful if differentiated by color, shading, or textures.

(2) *Area figures* (see fig. 58).—In this type of chart separate figures are contrasted to indicate the ratio between different amounts. Generally, the figures are pictorial; consequently the chart has attention-attracting values. Its advantages and limitations are similar to those of the pie chart.

e. Line graphs.—The line graph is a line or curve placed on a system of coordinates or a grid, each line of the grid designating a unit of value or time (see fig. 57). Because it is the most abstract

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type of chart, it requires special training for proper use. It is also the most accurate, and is, therefore, well suited to the presentation of statistics and the like.

f. Pictorial charts.—Pictorial charts are those which show objects or quantities by means of pictorial symbols (see fig. 73). Although all charts are good devices for representing ideas in graphic form, many are not interesting to look at. By animating the chart with figures and objects which not only attract attention but emphasize the major point, charts can be made far more lively teaching devices. Whenever ideas lend themselves to symbolic or pictorial representation—and nearly all of them do—any time and effort spent in this direction will be well repaid in increased student interest and learning.

(1) *The symbols or drawings used are pictorial definitions of objects.* They should be self-explanatory and readily understandable and should represent an object in the most direct possible manner.

(2) *Color adds to the teaching value of pictorial charts.* Color is an invaluable addition to any teaching device. The most effective colors depend on the nature of the symbols: grey can be used for tanks, black for mortars, green for trees, etc.

157. Procurement.—The training aids officer should have a complete list of all charts available at the training center as well as of those that can be procured.

158. Making charts.—Those charts needed for only a few lessons can be prepared on wrapping paper or other inexpensive materials by the instructor. The suggestions made in paragraphs 153 and 154 will be helpful. If, however, charts are needed to illustrate important facts in lessons frequently taught in the training program, it will save time and energy to have these charts carefully prepared by specialists in the training aids section. The charts can then be saved and used many times by the various instructors on different problems in the training program.

Section VI

POSTERS, CARTOONS, AND ILLUSTRATIONS

	Paragraph
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Making posters, cartoons, and illustrations	163

159. General.—Illustrations, both humorous and serious, make a definite contribution to any training program. With the rapid devel-

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opment of profusely illustrated magazines and newspapers, men have become accustomed to looking at pictures as lively sources of information. The interest aroused by such illustrations is a significant factor in expediting learning and making it permanent.

160. Uses.—*a. Posters.*—Human interest posters can be as valuable in military training as in commercial enterprises. Generally speaking, posters are most useful when hung in mess halls, barracks, post exchanges, and recreation centers. Displayed in such places, they offer an efficient means of insuring that students will continue to learn the fundamentals of military practices even when they are not undergoing formal instruction.

b. Cartoons.—Soldiers appreciate humor quite as much as do civilians. A humorous story enlivens a lecture or discussion. In a similar way, a cartoon emphasizing a major point in a lesson or course attracts and holds the students' attention. When properly used, cartoons give information, call attention to errors, and improve morale (see figs. 6, 23, and 25). They are a means of motivating students through appealing to their sense of humor, one of the most valuable assets a soldier possesses.

c. Illustrations.—Illustrative drawings, such as those used in this manual, bring realism and variety to verbal presentations and are frequently more forceful than a verbal description. Illustrations that are large enough to be seen from the wall or that are projected on a screen may be used in classes. They may also be used in texts, manuals, and any other printed materials for military use (see especially the line and shaded drawings in FM 21–45). Their use, however, should not be confined to class periods. Men learning to become soldiers need to live and think in military terms. The walls of recreation centers, mess halls, and the like, often barren of interest, can be made a genuine part of the training program if they are used to display drawings and paintings of military activities. Soldiers like to see their activities recorded, and get a feeling of pride from the importance which a good painting or drawing gives to military life.

161. Criteria of effective posters, cartoons, and illustrations.—These aids must have sufficient visual appeal to attract and hold the attention of students long enough to impress on them a story, fact, idea, or image that they will remember. Specifically, these visual aids should—

a. Be directly related to the training program.—There are phases of every training program that can be given new meaning through illustrations. Some examples are portraits of heroes; scenes of bridge construction, drill, parachute training, tank formations; wholesome recreational activities, and even KP duties.

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b. Tell their message clearly and forcibly.—Posters, cartoons, and illustrations should leave no doubt as to the message, story, or ideal they express. Although labels and captions may be used for emphasis, the pictorial forms should be meaningful quite aside from words. A poster on safety precautions should tell the observer at a glance what he is to learn from it; a cartoon should throw new light on an important point; and a drawing or painting should represent military actions or scenes in an impressive, morale-building way.

c. Be well designed.—The effectiveness of any visual aid depends to a high degree on how well it is composed or designed. A poster or a cartoon should be centered on one dominant note. Its force lies in its simplicity and directness, in its forceful composition of forms. A drawing or painting, being a more permanent training aid, can be more complex and detailed so that it will hold interest over a longer period.

d. Be colorful.—Color interests people. When well used, it is one of the best means of directing attention toward something important. Bright, vivid color is generally used in posters, while more subdued color can be used in paintings.

162. Procurement.—Posters relating to military training and ideals can be secured from a variety of sources with which the training aids officer should be familiar. A limited number of cartoons and illustrations are also available.

163. Making posters, cartoons, and illustrations.—These training aids should be made by specialists competent in this line of work. Any poster, cartoon, or illustration which shows evidence of incompetent or amateurish illustrative ability loses most of its effectiveness. Especially in posters and cartoons must the idea developed be free of any point that might offend any class, race, or group. It should be comparatively easy to locate the necessary trained personnel in any large training center. The equipment needed will vary from one situation to another but in general will be similar to that listed in paragraph 154.

Section VII

PHOTOGRAPHIC TRAINING AIDS

Paragraph
Training films and film strips 164

164. Training films and film strips.—*a. General.*—The use of training films and film strips as instructional expedients in Army training programs has brought about many improvements in teaching procedures. Their use has made it possible to teach in the classroom

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many phases of military training which otherwise would require extensive equipment, special situations, lengthy rehearsals, and considerably more time. Procedures can be demonstrated at normal speed or in slow motion so that every member of the audience can see exactly what is taking place. Training films set uniformly high stand-

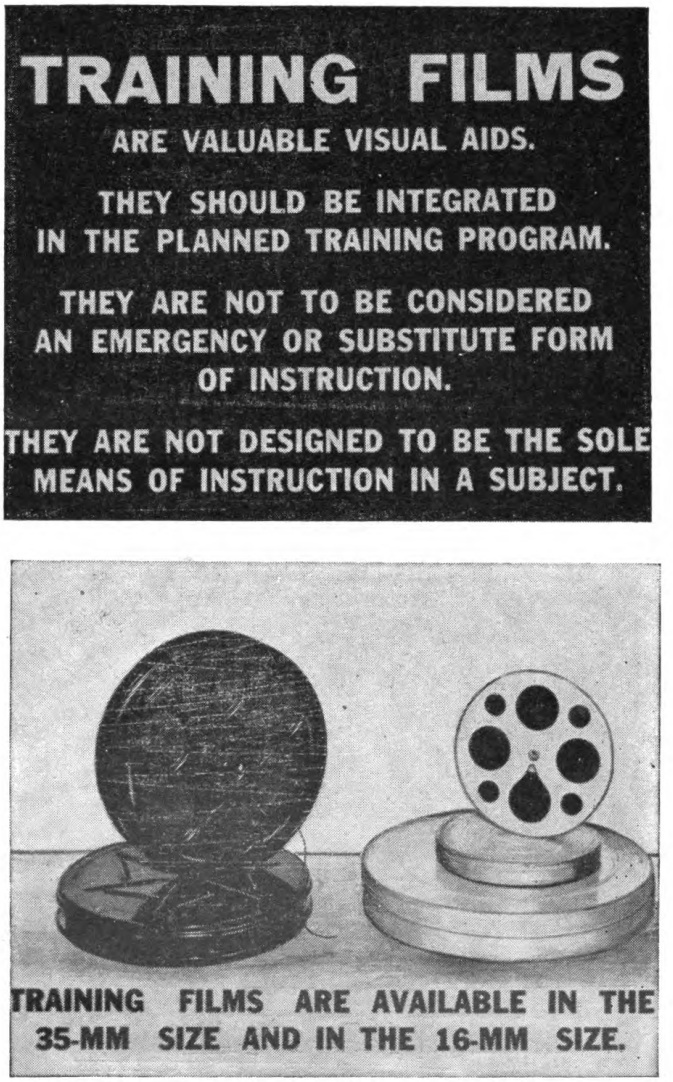


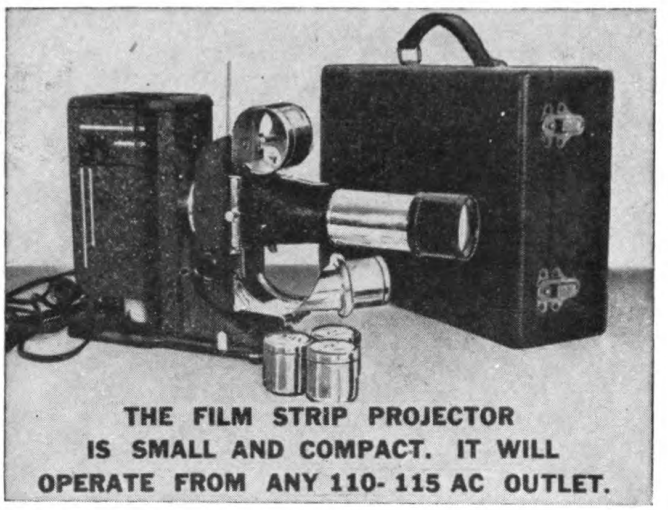
FIGURE 75.—Training films.

ards of achievement because they show to all students operations and procedures as performed by experts. It may well be said that no instructional program is complete without training films and film strips.

b. Selection.—Films should be selected and used when they will serve the needs of the training situation better than other devices or

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methods. They must always be chosen so they will be an integral step in the attainment of the objective. They should never be regarded as rainy-day substitutes, nor should they be used because the instructor has not prepared his lesson properly. Before using either a training film or film strip in a class, the instructor should study it—several



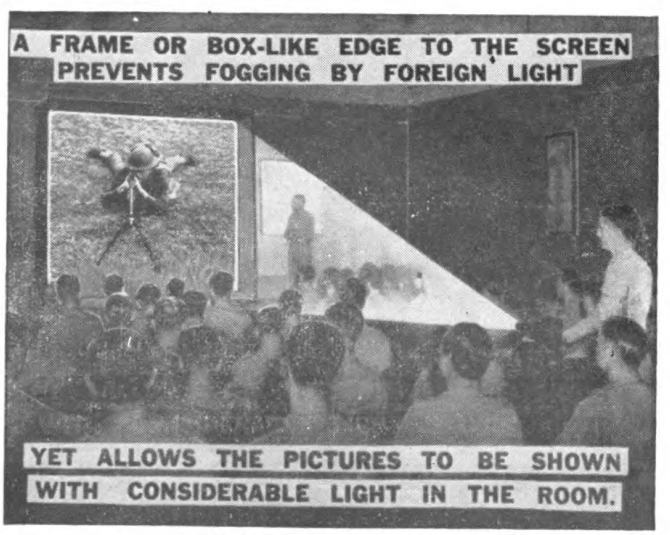


FIGURE 76.—Film strips.

times if necessary—in order to be thoroughly familiar with the contents.

c. Use and care.—Every instructor should carefully read paragraphs 1 to 8, inclusive, FM 21–7, and paragraphs 78, 79, and 80, FM 21–5. TF 7–295 and FS 7–75 present many useful suggestions. The instructor should also review paragraph 44*e*, and should study figures 19, 22, 33, 75, and 76. A shadow box, as shown in figures 76

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and 77, can be constructed so that films can be projected in partially lighted rooms.

d. Distribution.—The available training films and film strips are listed in FM 21–7 and supplements; paragraphs 5 and 6, FM 21–7,

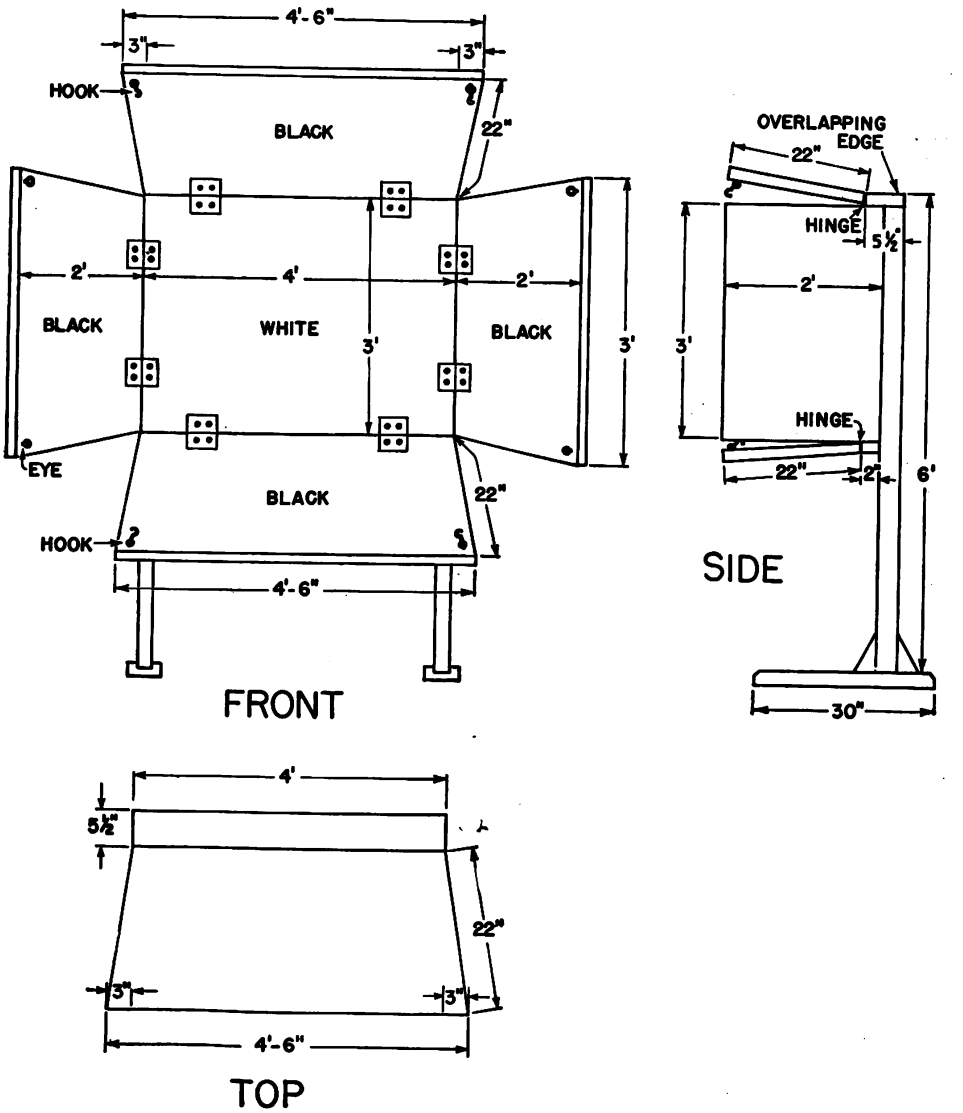


FIGURE 77.—Shadow box for use in projecting films and film strips in partially lighted locations.

give information on their distribution. If needed films are not available at the training center film sublibrary, they should be procured by the officer in charge well in advance of the time when they are needed.

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SECTION VIII

PRINTED TRAINING AIDS

Paragraph
Field Service Regulations, Field Manuals, and Technical Manuals---------- 165
Other printed training aids---------- 166

165. Field Service Regulations, Field Manuals, and Technical Manuals.—*a. Procurement.*—These publications are listed in FM 21–6 and supplements, and may be procured through the distributing agencies listed in AR 310–200.

b. Use and care.—The publications listed in FM 21–6 contain the official doctrines and procedures to be used in training programs. A complete set of these publications, filed in order, should be available to the instructional staff of every training program.

166. Other printed training aids.—In the conduct of training programs, the need for special printed training aids will arise. Because these are definitely related to the special problems of the different training centers, they can be prepared under the direction of the training officer. These may be duplicated bulletins, single sheets of directions or information, cartoons or illustrative material for bulletin boards, etc. They should all be prepared with the following considerations in mind:

a. They must conform to established Army training doctrines and regulations.

b. They should be simple, clear, and concise.

c. They should be prepared to appeal to students, to encourage them to read and study the materials. Training aids should not be merely dry statements of facts.

d. They should be of a size convenient for use.

e. They should be illustrated as fully as the need requires.

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(For explanation of symbols see FM 21–6.)

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