OREGON TRAINING AIDS

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A TRAINING AIDS PLAN BASED ON ARMY EXPERIENCES, WITH APPLICATIONS TO OREGON

by

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A TRAINING AIDS PLAN BASED ON ARMY EXPERIENCES, WITH APPLICATIONS TO OREGON

CHAPTER I
INTRODUCTION

A. Purpose of the Study.

The purpose of this study is to show:

1. How an Army Air Forces type of Training Aids Unit for the purpose of preparing all kinds of instructional material except full length sound motion pictures, film strips, and textbooks may be adapted to the Oregon Educational System.

2. The function and opportunities for such a unit in the system.

B. Need for the Study.

"Can our schools teach the GI way?" (1)

This has been a burning question ever since the Armed Forces started their immense training programs. But, unfortunately, the replies have been very confusing, and many of the answers have contained more heat than light.

One Oregon educator said, "Give us the GI money and watch us outdo the GI way." (52)

An Arizona teacher said, "Can our schools teach
the GI way? Wrong title, Mr. Adams! Rather say, Can our schools get the GI funds?" (45)

Another said, "Navy does it, why don't we?" (27)

But, while one teacher asked whether we should have "Education 1940 model or GI style," (29) another put forth this plea: "We honor the dead of Bataan. Heroes, we call them, and rightly so! They held the fort with crude and insufficient equipment against the savage inroads of the Japs. We hold the fort of education with the same crude and insufficient materials against the savage inroads of ignorance." (45)

"'Back the Attack' is the national war cry. 'Back the Attack' has been the cry of public school education. Ours has never been heeded." (45)

One magazine announces that the "Army Quits the Colleges." (28) But another says that "College Deans Learn How to Teach for War......" (37)

As one writer tells how the "Army Streamlines Language Instruction," (43) another asks, "Are the Changes Here to Stay?" (19)

While one writer throws out a post war challenge like this: "Such go-devil teaching is common to the Army and Navy. It's doubly exciting because it perhaps presages changes in school-teaching after the war." (1)
Another writer comes back with this plea in defense of prewar schools which is heart-rending indeed! "You have ridiculed publicly the hundreds of thousands of public servants engaged in the education of the youth of the nation. You have belittled the efforts of courageous people who persevere under wretched conditions. You glorify the GI school which carries on its work with inexhaustible federal funds and unhampered access to public and private equipment. You scorn us to whom these advantages have been wilfully denied." (45)

Especial attention is called to the last line in the quotation above because "these advantages" will likely continue to be "wilfully denied" unless someone shows the way--unless someone sets forth a workable plan for taking advantage of the good points in GI education. The literature is filled with splendid articles containing many helpful suggestions, but no one has yet produced in detail a complete plan for adapting some of the GI methods to the postwar schools. The purpose of this thesis is to show how one phase of GI education can be adapted immediately. The GI educational program is too broad and extensive for any one investigator to work out all the details of adaptation, so this study will limit its effort to
one of the "king pins" in the GI program, namely, the "Training Aids Unit."

Some leading curriculum directors in Oregon were contacted in order to determine whether they thought the schools of this state were ready to patronize a Training Aids Unit if one were established.

Mr. Watt A. Long of Portland, felt that there was a pressing need for instructional aids and that every effort ought to be made to get a Training Aids Unit activated this coming winter. He further suggested that a state committee be appointed immediately to expedite the organization of this unit. This committee, he believed, might publish a list of suggestions for the schools. The report would contain suggestions on the purchase of visual equipment. It would also suggest ways and means for utilizing surplus army equipment and in general it could prepare the groundwork for the coming of the new Training Aids Unit.

Mr. Walter Snyder of Salem, was quite enthusiastic about the proposed unit. He believed that it would be welcomed by both the large and small schools alike. Mr. Clarence Hines of Eugene, suggested that the new unit be prepared for rapid expansion because he believed that the teachers would call so enthusiastically for material that a small unit would soon
be unable to meet the demand. He said that they had been wondering for some time just how Eugene could best profit by the army schools. They had finally come to the conclusion that a few mock-ups on electricity were about all they could use in a material way, but the possibility of a Training Aids Unit opened up a new field of opportunity for them. In other words, while it was not possible to use many of the actual training aids prepared by the armed forces, it would be highly practical to take the armed forces plan or method for preparing aids and use it to prepare aids for Oregon teachers.

Another indication that Oregon teachers are anxious to have a complete source of instructional aids prepared for them is shown in the study made by C. W. Quaintance and reported in the December 1944 issue of Science Education. The data for this study was obtained from a questionnaire which was sent to elementary science teachers throughout the state. One part of the questionnaire asked the teachers to list their worst problems and high on this list they put this problem: "Inadequate source of materials on western flora and fauna."

Chapter III of this thesis will show how an Oregon Training Aids Unit can help elementary teachers
overcome this problem.

C. Limitations of the Study.

1. This study will show the organization and function of a Training Aids Unit, but it will not attempt to determine the exact department or institution in which it should be located and controlled.

2. This study will be limited to the preparation of materials for the elementary and secondary schools of the state although the Training Aids Unit may eventually grow to such size and importance that it will be asked to supply aids to all educational organizations in the state.

3. The writer of this report has been informed that the American Council on Education, one of the largest educational research organizations in the United States, is planning to make a detailed and comprehensive study to evaluate and determine the exact worth of each phase of the armed forces training program. The proposed research of this organization will involve the expenditure of huge sums of money, far beyond that usually available to any one investigator; consequently this report will be limited to a discussion of evaluations of research studies already found in the literature and to the opinions of some members of the Armed Forces who were responsi-
ble for developments in the training programs.

D. Methods Used in This Study.

1. Most of the materials for this study were collected during the two years the author worked for the Army Air Forces helping develop and perfect their Training Aids Units.

2. Considerable additional material has also been obtained from the literature and other library references to GI Educational Methods.
CHAPTER II
DEVELOPMENT OF THE ARMY AIR FORCES TRAINING AIDS UNITS

This section will discuss briefly the historical development of the Air Forces Training Aids Units to clarify some of the recommendations which are made for the development of a Training Aids Unit in the Oregon Educational System.

A. Status of the Training Aids Units in the Air Corps at the Beginning of the War.

Originally all pictorial aids were made for the Air Forces by the United States Army Signal Corps. Signal Corps officers would be assigned to the Air Forces to study their teaching needs and then prepare motion pictures and film strips to cover these needs. The Signal Corps prepared hundreds of thousands of feet of teaching films for the Air Forces, but as the need for local or "spot" material became more acute the Air Forces gradually took over the preparation of much of their own training aids.

The Technical Data Section, Maintenance Division, Headquarters, Air Service Command was established to direct the development of instructional material for the Air Service Command. The Air Service Command was the specific organization in which the writer was employed.

The basic essentials of the development of instruc-
tional materials showed the following trends. The Training Aids specialists soon recognized that their material could be roughly divided into two general classes.

1. Motion pictures, film strips, and Technical Orders pertaining to basic materials which would be circulated to all depots. This material was standardized, rather inflexible, and called for mass production methods. Thus only a few places had facilities which were adequate for the production of this type of material. The motion pictures were produced almost entirely at Patterson Field, Ohio and Hollywood. The production of film strips was allocated to five centers. The Technical Orders which were a form of instruction sheets for the Air Service Command were produced almost entirely at Patterson Field, Ohio.

2. The other group of instructional materials included local items of a restricted nature which would usually have only a limited circulation but which had to be made quickly available. This local material consisted of such items as photographs, flat pictures, charts, graphs, pocket manuals, specimens, exhibits, mock-ups, ozalid prints, which are similar to blue prints, tests, and lantern slides. The need for this local material was not immediately apparent but as the war progressed the Armed Forces recognized the need for more personalized instruction. This feature has attracted the attention of many
civilian educators who have made a study of GI education, for example: Dr. Stephen F. Bayne, assistant superintendent of the New York City schools, called attention in a national broadcast to the great amount of individual teaching and attention given to each soldier. He was impressed by the fact that GI training is not the stereotyped, belt-line type of education that is common in the large classes of our public schools.

Much experimentation was necessary before smooth running, efficient organizations could be set up to produce the type of material called for in group two. The final and successful Training Aids Units will be discussed in the next section.

B. **The Organization of an Army Air Forces Training Aids Unit.**

1. **The Line of Command for a Training Aids Unit.**

The Training Aids Unit was located in the depot training section. Thus the line of command ran in this order: Commanding General, Air Service Command, next the Commanding General of the depot. Under him was an officer in charge of the depot training section. Working along with this officer was a civilian Training Administrator. Under this Administrator was a Civilian Training Specialist in charge of the Training Aids Unit. The Aids Unit consisted of the following departments: Writing, Art, Photography,
PLATES 2 TO 8

INSTRUCTIONAL AIDS

These plates show some of the types of instructional aids used by the Air Forces as well as typical suggestions on how to use the aids effectively.
Chapter 9

INSTRUCTIONAL AIDS

LANTERN SLIDES  FILM STRIPS
TRAINING FILM

DIAGRAMS  CHARTS
BLACKBOARDS

PICTORIAL MATERIAL
PROCESS DISPLAYS

MANUALS  TEXTBOOKS

MODELS  OBJECTS
CUT-AWAYS
INSTRUCTIONAL AIDS

In any of your jobs or activities, you have no doubt prided yourself on being able to select the right tool for a given job, and to use that tool correctly. Whether you were assembling an engine, checking a long column of figures, or making a repair part, you saved yourself time by knowing which tool to use and how to use it. You did a better job because you used the right tools.

As an instructor you will have opportunity to use certain "tools," which will make the instructional process much easier and much more effective. If you are familiar with them and know how to use them properly, you will be able to save time and to do a better job. Among these instructional tools are the various devices known as instructional aids, such as motion picture films, mock-ups, and the like. To be effective, they must be used in accordance with the principles of learning which you studied in Chapter II.

Some of these instructional aids are called visual aids, which help the trainee to learn through seeing. Others may also be of the auditory type, which the trainee hears as well as sees.

Visual Aids                               Visual-Auditory Aids
Film strips                                Sound motion pictures
Silent films                                Sound film strip
Lantern slides                             Charts and diagrams
Opaque projectors                          Cut-aways, models and
Blackboard material                        mock-ups
Charts and diagrams                        Instructional guides, text-
Cut-aways, models and books, and lesson sheets

There are many special devices used for teaching special subjects. The electrical instructor might use the oscilloscope to show what is happening in an electrical circuit. The instructor of inspectors might use the X-ray machine to demonstrate the different kinds of flaws found in materials. In this chapter, you can find out how to use some of the more common devices such as those listed above.

I. FILM STRIP

A film strip is a series of individual pictures on a strip of film and looks much like motion picture film. There may be any number of these pictures on one strip, but usually about thirty or forty are used in a series. The pictures are projected on a screen or on the wall by means of a small projecting lantern. The film is turned one "frame" or picture at a time and is left on the screen as long as may be needed. The pictures may be of any type, including photographs, charts, drawings, or printed matter. You will find film strips convenient in many ways.

A. ADVANTAGES OF FILM STRIPS:

1. They can be shown against the surface of any blank wall if it is not in the direct sunlight.
2. The equipment required for projecting film strip is very simple and easy to operate.
3. Film strips are easy to store and transport.
4. Since you can move the strip backward or forward in the machine, you can review any particular frame that needs emphasis.

B. SUGGESTIONS FOR THE USE OF FILM STRIPS:

1. Choose film strips that really fit the lesson you want to teach. If any particular frame is not appropriate, you can skip it as you move the strip through the machine. Use only the frames that have the greatest value for your instruction.
2. Go over the film strip several times carefully before the lesson begins. Otherwise, if you try to study the material while you are showing the film, the trainees soon lose interest.
3. Avoid showing too much material in one session. Ten or fifteen minutes spent in showing film strips are enough.
4. Get the trainees ready before you actually show them the film strip. You might tell them what they should notice particularly.
5. Follow up the showing of the film with questions, discussion, or a short test. The trainees will pay better attention if they know some check-up is coming.
Each air depot has a large assortment of film strips. You should find out what strips are available in your field and use them whenever they will add interest or clearness to your instruction.

Sometimes film strips are used in connection with phonograph records, and the frames of the film strip are turned one by one to synchronize with the sound record. The sound record provides a definite signal at intervals, and the operator turns the film strip when he hears this signal. If you use this type of instructional aid, run the film and record through a time or two before your class session so that you will be able to keep the film synchronized with the record.

![Figure 74—Lantern slides](image)

### II. LANTERN SLIDES

You can use lantern slides in much the same way as film strip, and the suggestions given above are good for slides as well as for film strips. Besides, it is easier to omit a slide than to hurry through an unimportant frame in the film strip.

If you have ever sat in an audience while a lecturer shuffled through his slides trying to find the proper one, or to get them in the right sequence, you understand why you should go over the slides carefully before you start showing them to the trainees. Use only the few, particularly appropriate slides that are directly related to the instruction. Discuss them carefully before and after you have shown them.

Colored slides are especially useful for showing operations, equipment, and the like where color is an important factor.

### III. PROJECTION OF PRINTED ILLUSTRATIONS AND MATERIALS

When you wish to project on the screen some picture in a textbook or a Technical Order, an "opaque" projector is very useful. The illustration is held in position, usually at the bottom of the projector, and the image is thrown upon the screen. Sketches or drawings are often projected in this manner. It is sometimes used by electrical instructors to show meter readings. A meter which is connected in a circuit may be placed beneath the projector. Thus, the face of the meter is projected on the screen, and movements of the meter pointer across its dial can be seen by all trainees.

![Figure 75—The opaque projector](image)

### IV. TRAINING FILMS

Both silent and sound motion pictures are most effective in your shop or classroom when they show materials and operations that cannot be given to the trainees in any other way. If you cannot show them real machines of the size and type they will use, your best substitute may be a training film.

Always select training films with great care, and plan their use as you would plan a lesson. Prepare your trainees for the material they will find in the film, and test them after you have shown it. The following plan shows in detail how to arrange an instructional period in which you use film of any kind.

**A. WHAT THE INSTRUCTOR SHOULD DO BEFORE THE INSTRUCTIONAL PERIOD:**

1. Choose a film of proper length. It may last from 15 minutes to an hour; but usually, the shorter it is, the better.
Chapter 9

(2) Decide definitely on the purpose of the film. Although there are a number of purposes, you are likely to use a film for one of these three:
   a. To show a particular operation or series of operations.
   b. To give an overview of the course.
   c. To explain a fundamental principle.
(3) The content of the film you choose should:
   a. Be simple, understandable, and real to your trainees.
   b. Show the skills, information, and attitude you expect the trainees to develop as a result of the particular lesson or the course as a whole.
   c. Demonstrate operations clearly and correctly. Difficult operations should be shown in slow motion.
   d. Be adapted to your trainees' needs at the moment. The films should be neither too advanced nor too elementary.
(4) Sometime before the lesson, arrange to have the equipment set up. Be sure that the seating arrangements in the room are convenient.

B. GETTING THE TRAINEES WARMED-UP:
(1) Explain to the class the purpose of showing the film.
(2) Tell them the main features of the film, that they should observe.
(3) Announce your intention of holding a class discussion or quiz on the film after they have seen it.

C. SHOWING THE FILM:
(1) You can make comments during the showing if you are using a silent film.
(2) If possible, remove all distracting influences, such as unnecessary light, noise, or activity.

D. AFTER THE FILM HAS BEEN SHOWN:
(1) Ask appropriate questions in written or oral form.
(2) Conduct a discussion about the film.
(3) Summarize the main points of the film before dismissing the trainees.
(4) If the material presented by the film is difficult, you may have to show the film a second time.

V. THE BLACKBOARD

You will probably use the blackboard more than any other visual aid because it is convenient and usually available. Most classrooms and shops are equipped with blackboards. If you need to improvise one, use thumbtacks or clips to fasten a wide strip of wrapping paper to wood or wallboard surfaces, and use heavy crayon to mark on it.

Here are some types of material that can be put on the blackboard:
(1) Sketches.
(2) Diagrams.
(3) Outlines.
(4) Definitions.
(5) Directions and assignments.
(6) Summaries.
(7) Examinations.
(8) Supplementary information.

Sometimes you may ask an individual trainee to recite from material on the board or to solve a problem at the board while the others watch. If you have enough blackboard space, you can send the entire group to the board to work out problems.

In order to use the blackboard most effectively, you may be interested in the following suggestions:
(1) Keep the blackboard clean so that the chalk marks are fresh and clear.
(2) Regulate the lights to avoid glare.
(3) Use readable letters and figures large enough so that they can be seen by all trainees.
(4) While you are talking about the material on the blackboard, face the trainees and not the blackboard.
(5) Stand at one side of the work that is being discussed.
(6) Use a pointer to explain the material you have written on the blackboard.
(7) Arrange blackboard material in a neat and orderly way.
(8) Erase material not needed by you or the trainees.

VI. CHARTS, DIAGRAMS, AND GRAPHS

Pictures often give information much more vividly than words. Likewise, charts, diagrams, and graphs are useful to impress trainees with information otherwise difficult to present. Whenever you have long lists of figures to be compared, try to put them in a vivid chart or graph. Often you can find prepared materials ready for use in class. Small charts can be projected on the wall from the opaque projector previously described. Several types of graphs and charts are shown in figures 81 to 84.

Figure 80—Sharpen chalk for wide or narrow lines

![Figure 80](image)

Figure 81—Curve graph

![Figure 81](image)

Figure 82—Circle graph

![Figure 82](image)

For sketches, drawings, or diagrams, you can get the best effect by sharpening your chalk. To draw narrow distinct lines, use a pointed chalk. For broad lines, use a chisel-pointed chalk.

To emphasize or distinguish certain parts, use colored chalks for lines, or shaded sections of drawings or diagrams. Colored chalks add interest and bring out the high points of a lesson.
Chapter 9

Another useful form of illustration is the Organization Chart. In figure 85, such a chart shows the organization of the civilian training program at an air depot.

In figure 86, you can see how diagrams on wall charts can be used in a shop where trainees are learning to work with hydromatic propellers.

For pictorial material in general, wall charts often help trainees understand more clearly the nature of operations, material, or parts of objects.

VII. OBJECTS, CUTAWAYS, MOCK-UPS, MODELS, AND PROCESS DISPLAYS

Actual objects may be used to illustrate and demonstrate your lesson. Trainees may also use these objects to apply directly what you have taught. In figure 87, the trainees are looking at the gyro horizon indicator on a real instrument board from a plane.

If cutaway parts are used, trainees can examine carefully the nature of operations normally hidden from view. The value of cutaways in teaching how something operates is suggested by comparison of the cutaway illustration in figure 88 with the propeller in the background of the same picture.

Figure 88—Cutaway propeller mechanism

Figure 89—Generator display board
Mock-ups show disassembled objects, assembled objects, or complete systems mounted on an instructional panel or stand. Here are kinds of mock-ups that you will find most useful:

A. DISPLAY BOARDS

(1) Show disassembled objects, such as the parts of a magneto or starter to teach the names and constructions of parts.

Figure 89 shows a display board with the parts of a generator on the lower half. If the parts were numbered, the order of assembly could also be made clear.

(2) Show assembled objects to make clear the construction and assembly of the whole mechanical unit. The pointers on the display board in figure 89 show the relationship between the parts and the entire generator.

B. DEMONSTRATION BOARDS

A complete system, such as the hydraulic system, electrical system, radio system, or fuel system, may be mounted on a board so that it operates just as it would on an airplane. You will find that this kind of mock-up is particularly useful in demonstrating the assembly and operation of a system, the methods of trouble shooting, and the procedures for maintenance and repair. In figure 90, a small board of this type shows a brake and cylinder assembly.

Models are useful devices in teaching many subjects. If commercial models are not available, you or the trainees can construct a model from improvised materials or worn-out parts. A model airplane is shown in the background of figure 88.

A process display shows the various steps in the manufacture of an article, such as an aircraft engine forging, nose rib, spar, or propeller. Often these displays show the raw materials from which the product is manufactured. (See figure 91.)

VIII. TEXTBOOKS, MANUALS, AND TECHNICAL ORDERS

Printed instructional material of one sort or another forms the backbone of the instructional aids used in most training programs. In air depot training, the more commonly used materials include Technical Orders, Instructional Guides, and other Training Manuals. If a special instructional guide has been prepared
Visual Library, Printing, and Secretarial.

Each department was in charge of a supervisor except the writing department which was divided into writing crews with a supervisor-consultant in charge of each crew.

2. Qualifications of the Personnel.

The Civil Service Department had a detailed list of qualifications required for each position, but only those qualifications will be listed here which have a direct bearing on the selection of personnel for the Oregon Training Aids Unit.

a. Supervisors.

The supervisors were expected to be specialists in their field as well as have administrative ability. For example, the Art Supervisor must be an experienced artist, the Photography Supervisor must be an expert photographer, and the Writing Supervisors were expected to have had writing experience in the publication of articles and books, or to be able to demonstrate their writing ability in some other manner equally effective.

b. Consultants.

Those who carried out these duties needed a broad background not only in the field of audio visual aids but also in the fields of curriculum making, industrial arts, and modern education--its objectives and methods.
c. Writers.

The requirements for writers went through almost a complete cycle. At first it was thought that in order to write instructions for a highly specialized piece of equipment such as a hydromatic propeller, only a specialist on this propeller could write about it. But it was found that very few specialists in the field of aeronautics or engines could write so that a beginner could understand it. A job analysis of this problem showed three characteristics were essential in every set of instructions.

(1) The material must be technically accurate.

(2) It must be pedagogically sound.

(3) It must be readily understandable by a man or woman with less than an eighth grade education. Since it was practically impossible to find subject matter specialists who could write material which met all of the above requirements, the supervisors faced the task of training their writing crews. If they chose a vocational expert he must be taught the intricacies of writing and teaching. If a teacher were chosen he must be taught writing and mechanics or if a writer were selected he must be taught mechanics and teaching. Experimentation showed that writing was the most difficult of the three tasks. In general it took far less time to teach a professional writer the intricacies of a machine than it took to teach an engine
expert, for example, how to write in a simple language which could be understood by an ordinary reader. Short story writers proved to be the best prospects, especially those who had had considerable experience writing for the "pulp magazines."

Another refinement which added considerably to the writers' efficiency was to specialize their work as much as possible. This specialization was further enhanced by organizing writing crews in which each person had a special job to do. For example, there was the research man, writer of the first copy, rewrite man, proof reader, the man who planned the illustrations, etc. Various combinations of these jobs could be consolidated depending upon the size of the crew needed.

d. Artists.

Standard commercial artists were employed for this department. They needed experience in one or more of the following fields: illustrations, cartoons, posters, charts, flat pictures and the silk screen process which is a method for duplicating large posters.

e. Photographers.

The key photographers were men having commercial experience, especially with the Speed-Graphic Camera and flash pictures. The remainder of the crew, including the dark room help were unskilled workmen trained on the job.
f. Visual Librarians.

This crew consisted of a person who had a good visual background and several other persons who were unskilled workmen trained on the job.

g. Printers.

The specific skills needed for this work were:
(1) Ability to make multilith plates for the multilith press.
(2) Ability to operate a multilith type printing press.
(3) Ability to print material by the silk screen process.

h. Stenographic Help.

Much of the work had to be done by whatever stenographic help the department could get, but it was found that college graduates or persons with pronounced writing ability were enough of an additional asset to more than make up for the extra salary.

3. Equipment Needed for an Army Air Forces Training Aids Unit.

a. Writing Laboratory.

Since the work of the writers was so closely related to that of the artists and photographers, it was found that all of the work was greatly expedited by having the
three departments as close together as possible. Two types of writing laboratories were tried. One type consisted of separate enclosed booths for each writer, and the other type was a room in which a complete writing crew could work as a unit with its supervisor. Each type had its unique advantages, but after a few months trial more writers preferred the unit plan to the individual booths.

b. Photographic Laboratory.

The photographic laboratories usually suffered more from lack of space than from lack of equipment. The following list of equipment includes the major items which were typical of most Air Forces photographic laboratories. The number of duplicates of each item depended upon the amount of work to be done and will not be indicated here.

1. Copying camera, 24" x 24"
2. Speed Graphic with synchronized flash unit, 4" x 5"
3. View camera, 5" x 7"
4. Miniature camera—35 mm
5. Motion picture camera, 16 mm
6. Enlargers of various sizes ranging from those which would take 35 mm film up to those which could take 12" x 12" film
7. Automatic printing boxes
8. Printer-copyers which could print pictures directly
from magazines, newspapers, etc. (Hunter, Electro Copyist)

(9) Ozalid printer
(10) Print dryer
(11) Print straightener
(12) Print washer
(13) Print trimmer
(14) Sound recorder and sound proof booth
(15) Complete photographic studio
(16) Complete dark rooms

c. Art Department.

Standard art equipment such as drawing tables, desks, air brushes, pantographs, etc. were sufficient for this department.

d. Visual Library.

The Army visual libraries were quite similar to standard city visual libraries, consisting of such items as motion picture films, film strips, lantern slides, flat pictures, models, exhibits, and projectors. The unique part of some of the Air Forces visual libraries was that they furnished projector operators for all showings and the equipment was moved from class to class on portable tables called "projection jeeps."
f. Silk Screen Department.

This department reproduced large posters and multicolored material when only about 100 copies were needed. The department contained the same standard units found in any commercial silk screen plant.

4. Operation of an Army Air Forces Training Aids Unit.

The operation of a large Training Aids Unit naturally involved many problems such as supply, personnel, inter-
depot coordination and production. But the latter is the only one which will be discussed here because of its unique bearing upon the proposed Oregon Training Aids Unit. The steps in the operation of a Unit will be more easily understood if the production of some training aids are followed through from their inception to their printing and use.

a. Consultant.

The local and specific training aids usually started with a problem in the classroom. Either the instructor felt the need for supplementary material or the supervisors sensed a weakness which needed attention. In any case, the consultant was called in to talk with the instructor. The consultant needed to acquaint himself with certain facts before he could recommend a solution. He needed to find out:

(1) The nature and purpose of the topic being taught.
(2) The instruction material available.
(3) The methods used by the instructor.
(4) The type of aids with which the instructor was the most familiar and which he preferred to use.
(5) The specific parts of the lesson which needed "bolstering up."
(6) The size of the class and place in which the aids would be used.

Sometimes it was judicious to confer with the instruc-
tor's supervisor after the classroom conference and acquain him with the type of aids recommended. Following this step a writing crew and some artists were assigned to the job.

b. Writing Crew.

The first step for the writers would be research in the collection of data. As a part of this phase, a technical specialist would be consulted in order to be sure of technical accuracy.

The next step differed considerably from the normal procedure in the civilian preparation of manuscripts. Usually a manuscript is illustrated after it is written, but speed was so essential in a Training Aids Unit that the art work needed to be started at the same time the writers began writing the first rough draft. Thus when the overall plan was completed the writing supervisor needed to have the plan so well in mind that he could determine the type, number, and exact content of each illustration which was to go into the teaching unit. This procedure seemed awkward at first, but it soon became obvious that the illustrations had more effect upon the nature of the material to be written than the script had upon the illustrations. When the writing was completed it was returned to the technical expert for a final inspection to insure perfect accuracy, then it went to the supervisor who prepared the
final dummies for the photographers.

c. Artists.

The artists would make pencil sketches from the suggestions given them by the writing supervisor. These sketches would then be returned to the writers for suggested changes and approval. The final step would be to make ink drawings for the photographers. Since speed was important in the war effort and cost will be the vital factor in our public schools, the type of drawing made by the artists has considerable bearing on both of the above factors. In order to determine the relative cost of the various drawing techniques, the writer of this paper made a study of some of the methods preferred by the artists. The method used in this study was:

(1) Have the principal artists in the department make a series of drawings using each of the different techniques.

(2) Report the average time required for each type of drawing.

The results of this experimentation showed that the "craftint" process was the fastest. (See Plate 9) Craftint is a patented paper containing chemicals which bring out the crosshatch lines. The crosshatching is developed by means of a paint brush wet with chemicals. The lines of the engine shown in the figure were made with regular pen and ink.
PLATE 9

THE "CRAFTINT" PROCESS
1. Craftint Doubletone paper
2. Paper Cost - 4.50 sh. (6 illust.)
3. Illustration - 1 hr. - 45 min (max)
4. Precision Pantograph cut time 12%
5. Illustrations - double size max
The next cheapest means of shading was the solid black and solid white shown in Plate 10. Drawings with this technique took the artist approximately one-half day to complete. Line shading took markedly longer depending upon the complexity of the lines. The same was true of stipple shading (See Plate 11). In general, the artists could not plan on doing much more than one drawing of this type per day. The wash type drawing was also time consuming and had the further disadvantage of requiring a half-tone screen when the multilith negative was made (See Plate 12).

d. Photographers.

The photographers would make glossy prints of the ink drawings prepared by the art department. Since the artists would draw to a size which was the most convenient for them, it was necessary for the writing supervisor to specify the final size of the glossy prints. The writing supervisor would next arrange the glossy prints on the varitype copies and return them to the photography department where the photographers would make multilith negatives of these dummies. These negatives were then ready to be sent to the printing department.

After the list of illustrations was determined in the writing department, the writing supervisor decided which should be drawn by the artists and which should be made
PLATE 10

SHADING BY MEANS OF SOLID BLACKS AND SOLID WHITES

This page is taken from a pictorial engine test. When this type of shading was used, the white portion of the drawing showed the trainee the part he was to examine the most carefully.
EXPLANATION

This section of the test measures ability to select the proper tool for each job.
In the space under each picture on the following pages, write the bin number of the correct tool (or tools) needed for the job pictured.
Look at the sample question carefully before answering the other questions.

SAMPLE QUESTION

The correct tool for removing the oil pressure pump is tool number, 2151. A picture of this tool can be found in the bottom left hand corner of the tool list.
The sample question is answered correctly when the number, 2151, is written in the space below the picture, as shown.

Remove oil pressure pump

[ 2151  ]
PLATE 11

OTHER TYPES OF SHADING

Drawings 18 and 25 show two types of line shading.

Drawing 26 shows a combination of stipple and line shading.
REMOVE SPRING BLOWER DRIVE COUPLING

CHECK BACKLASH BETWEEN GENERATOR DRIVE GEAR AND STARTER JAW GEAR

REMOVE CRANKSHAFT AND ARTICULATING ROD ASSEMBLY

REMOVE REDUCTION DRIVE GEAR
PLATE 12
WASH TYPE OF DRAWING

The gray tones in this drawing could be produced either with an ordinary artist's brush or with an air brush.
ENGINE CROSS-SECTION
THROUGH NO. 6 CYLINDERS
from original photographs. The following criteria indicate the guiding principles used by the supervisor in deciding which illustrations should be photographed and which drawn.

(1) In general the trainees preferred photographs to drawings because they were more realistic.

(2) Photographs were faster to make than drawings provided the original models were available.

(3) Could a photograph bring out the lesson principle as well as a drawing? (The less accessible parts of a machine often gave trouble unless they were retouched by an artist.)

The above description indicates the need of a field photographer who has had considerable experience in all phases of photography.

e. Printing Department.

The first job for the printing department was to make up the variety type copies according to the suggestions of the writing supervisor. The next step was to make the multilith plates from the multilith negatives. This is a standardized dark room process.

The completed multilith plates would be put on the multilith machine and the required number of copies run.

Two problems arose here which should be noted because of the influence they will have upon the operation of an Oregon Training Aids Unit. The first of these was color.
PLATES 13 AND 14
UNRETouched PHOTOGRAPHS SHOWING PROCEDURES
FOR ENGINE ASSEMBLY
The Training Aids Unit made an effort to use color in each teaching aid because the trainees showed a marked preference for those aids which were colored. The same result has been found in our public schools. For example, Goodykoontz in her study of "The Relation of Pictures to Reading Comprehension" listed the following points as a part of her conclusions:

"(1) Children prefer strong colors.

(2) Bold color groups with few but striking details are better than many details.

(3) Realistic pictures are preferable to conventionalized pictures." (25)

When color is used, two other factors must be considered in addition to motivation. They are: time and cost. Time was more important than cost in the war effort but the opposite is likely to be true with the Oregon Training Aids Unit. Here is how cost has a direct bearing on the use of color: The copy must be run through the press once for each color.

The other problem mentioned above was what printers call "register." This term refers to the fitting of one part of a picture over another part. If, for example, three colors are used to represent an object, the printing machine must be so adjusted that the three colors fall at exactly the right place.
The multilith press can be made to register to 1/32 of an inch but it takes time to adjust it that closely. The Training Aids Unit found that there was a pronounced saving when the original illustrations were so designed that registry need not be considered. This was accomplished by planning the illustrations so there were no close fittings or overlaps of color. (See Plate 15)

A final point to consider in the organization of a Training Aids Unit in which many thousands of articles are being steadily produced is the need for a coordinating plan of production. A "Flow Sheet" accompanying each item was the method used by the Training Aids Unit for coordination. An example of one of these flow sheets is shown in Plate 16.

SUMMARY

The Army Air Forces developed large production units for the preparation of instructional aids in their training programs. Most of the expensive aids as well as those dealing with general topics were prepared at Air Service Command, Patterson Field, Ohio.

Types of aids which came in this list were sound motion pictures, text books, and technical orders.

The lesser expensive aids as well as those of a more local and specific nature were prepared in the Training Aids Units of the local depots. Aids coming in this class
PLATE 15
COLOR REGISTER

This plate shows how close registry was avoided by leaving considerable space between the drawing and the printed matter.

The titles on this plate were printed in black while the drawing was printed in green.
1. CONTENT AND USE:
   a. This film presents detailed identifying characteristics of the Focke-Wulf 190.
   b. The following topics on the Focke-Wulf 190 are covered:
      (1) Wings.
      (2) Engine.
      (3) Fuselage.
      (4) Tail.
   c. This film may be used most effectively in aircraft spotter, orientation, fighter pilot, and Civil Air Patrol classes.
   d. The film can be shown any time during the course.
   e. This film may be shown in one sitting.
PLATE 16
FLOW SHEET
FLOW SHEET FOR PRODUCTION OF
FILM STUDY GUIDES

Please Initial Your Block Before Giving Folder To Next Party

<table>
<thead>
<tr>
<th>HASTINGS</th>
<th>EBY</th>
<th>MRS. SULSER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check completed drawings</td>
<td>Determine final size of drawings</td>
<td>Make work order</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CRUMB</th>
<th>MRS. SULSER</th>
<th>EBY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make 3 prints of each drawing</td>
<td>Return all material except negatives to EBY</td>
<td>Make paste-up of copy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEXTER</th>
<th>ADJUTANT</th>
<th>SCHAEFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make R &amp; R</td>
<td></td>
<td>Make veritype copies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EBY</th>
<th>MRS. SULSER</th>
<th>CRUMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make final paste-up</td>
<td>Supply color splotch</td>
<td>Make two negatives of copy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MRS. SULSER</th>
<th>SCHAEFER</th>
<th>EBY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multilith copies</td>
<td></td>
<td>Distribute copies</td>
</tr>
</tbody>
</table>
included such items as: posters, mock-ups, study guides, pocket manuals, and pictorial tests. The local Training Aids Unit had complete facilities for writing, illustrating, photographing, and printing or manufacturing all of the specific aids called for in the depot training classes.
CHAPTER III
SUGGESTED ADAPTATION OF AN ARMY AIR FORCES
TRAINING AIDS UNIT TO THE OREGON EDUCATIONAL SYSTEM

A. Purposes of the Army Air Forces Training Program
Compared to Those of the Public Schools.

It will be necessary to understand the purposes, objectives, and types of education for both the Army Air Forces schools and the public schools in order to know best how to adapt the Army Air Forces Training Aids Unit to the Oregon Public Educational System.

1. Education vs. Training.

A starting place in the study of objectives is to make a careful distinction between the terms "education" and "training" because the Armed Forces usually referred to their schools as "training schools" and "training programs." Webster's Dictionary defines education as: "act or process of educating; the impartation or acquisition of knowledge, skill, or discipline of character:" also, "act or process of training by a prescribed or customary course of study or discipline—as a common school education." On the other hand, training is defined by Webster as: "act or process of instructing, drilling, exercising, etc.; education, as the training of the mind, of a child. Act or process, by means of drill, practice, etc. of be-
coming proficient in some art or prepared for a test or contest."

The dictionary is not the only source of information for the meaning of education. Many leaders in education have also written their interpretations of the meaning of this term. For example, John Dewey said, "...education is the effort to actualize (social ideals) in human behavior." (18)

The Educational Policies Commission described education thus:

"Education, therefore, seeks to encourage the mastery of such knowledge, the acquisition of such attitudes, and the development of such habits as make a socially desirable way of living likely to be followed by the learner." (20)

A description of education as seen by writers in the field of educational psychology is given by Starch, Stanton, and Koerth:

"Teachers are reaffirming and rediscovering that education is mental development and growth, that to educate is to lead and draw out, not to force and pour in. Education is regarded as accruing from experiences that foster mental growth, develop personality, and promote adjustment to environment. The concept that education is functional is supplementing the notion that education is the acquisition of isolated segments of knowledge called subjects. It is no longer synonymous with schooling, though schools may educate. Education means developing new patterns of behavior from knowledge and experience, either personal or vicarious. It means acquiring knowledge and skill to control the behavior of self and of others in useful and desired ways. Education is the state of a person as a whole, not a plaster on his chest or a coat on his back."
Education must be acquired, it cannot be given. It is not primarily preparation for living, it is living. It means acquiring and integrating knowledge into effective patterns of living. In short, education is the dynamic control of self and of others through knowledge and skill in order to satisfy more effectively and competently the urges and energies of life." (49)

It will be noted that none of the above descriptions have made any sharp distinctions between education and training. They assume that skills, "drill, practice, training of the mind," etc. all play a part in the total process of education. A much sharper distinction between education and training can be found in the field of industrial arts.

Dean Schwerkhard in his book, "Industrial Arts in Education," distinguishes between education and training in this manner:

"It may be well, then, to consider that education is the process of acquiring knowledge and developing the ability to use it....Rather, training is a specialized process made up of the continued repetition of mental or physical acts for the purpose of acquiring perfection, ease, and alacrity of performance." (44)

Some implications which may be drawn from Dean Schwerkhard's distinctions are these: If a child learns the multiplication tables by a repetitive process, his task may be looked upon as training. Furthermore the acquiring of many mental skills can be looked upon as training. This thought is developed still further by members of the Educational Policies Commission when they
described the acquisition of mental or personality traits such as initiative and critical judgment:

"Initiative can be developed in the same way in which other learning takes place; that is, by confronting the learner with as many kinds of situations as possible that call for the exercise of initiative under the guidance of an expert teacher. It is the same pattern that is followed in teaching a person to read a foreign language, or to walk, or to swim, or to do problems in mathematics....

"Can critical judgment be developed through the process of education, and, if so, how is it done in the schools? We are dealing again with an acquired ability which comes as the result of innumerable opportunities to make choices and to arrive at conclusions, under the guidance of an expert teacher. In other words, critical judgment is developed just as is the ability to play chess, or to read a book, or to solve problems in geometry; that is, by long and continuous practice under the criticism of someone qualified to evaluate the decisions." (20)

These definitions throw additional light on the problem in that they point out the probability of some phases of training or the acquisition of skills appearing in many educational processes.

2. Objectives, Methods, and Materials of Army Air Forces Air Service Command Training Program.

a. It is impossible to find space in this paper for a complete reproduction of Army statements regarding training objectives, therefore, space will be allowed for selected quotations which are taken to be typical of the
The training objectives of Air Service Command are found on page A-2 of their "Plan for Civilian Training."

"The objectives of the civilian training program which the Secretary of War authorized for the War Department are:

"1. An integrated, over-all War Department training program that provides all civilian personnel with the knowledge, skill, habits, and aptitudes required to equal and exceed performance standards.

"2. Training for promotion of those who give evidence of capacity for advancement.

"3. Same careful consideration for civilians as is given soldiers in connection with training plans, appropriations, and program.

"4. The development of a high caliber of civilian morale, a resultant of the first three. That means to us that, if our supervisors are well trained in their man-to-man relationships, if our personnel practices are sound in selection, placement, remuneration, and working conditions, we shall have an enthusiastic and cooperative working force, without which efficiency is but an idle dream.

"5. Planning both the immediate and the long-term needs for flexibility in both programs." (4)

The specialized nature of their training is emphasized on page B-1 and page J-2:

"Training is a Service Function.

"Training courses should be designed to meet specifically the needs of the departments of the depots which they serve. The needs of the departments are continually changing, becoming more and more specialized. It is the responsibility of the Training Department to discover these changing needs and meet them in a minimum amount of time. The Training Department must work with the Engineering, Supply, and Headquarters Departments and sub-depots which it serves in order to provide
the types of training required. Information should be obtained as far in advance as possible concerning the number of personnel to be trained by specialized occupations and by time periods in each specialty, and the standards of performance desired by the department being served.

"Because of increased specialization in all departments of depots and sub-depots, it has become necessary to specialize the training to an ever-increasing degree. This specialization has been caused by the rapid expansion, the diminishing supply of trained workers, the influx of a steadily increasing number of women workers, and the shorter time available for preservice training. It is now necessary to train employees to perform satisfactorily a specialty on a production line basis and to place that employee on production without taking time to teach the things which are "nice to know" but unnecessary." (4)

The specific types of training in Air Service Command are discussed on pages B-2 and B-3:

"Types of Training.

1. PRESERVICE TRAINING.

A. PREEMPLOYMENT TRAINING.

Unpaid personnel being trained in public schools for specific Air Service Command occupations in Engineering, Supply, and Headquarters Departments of depots and sub-depots.

EXAMPLE: High school or vocational school programs (trainee unpaid).

B. MECHANIC LEARNER AND UNDER CLERK TRAINING.

Paid personnel being trained in depot or approved off-reservation schools for specific Air Service Command occupations. Mechanic learners are trained for occupations in Engineering Departments of depot or sub-depots for a period not exceeding 90 days before beginning productive work. In Headquarters and Supply preservice, trainees may be under clerks, junior typists, messengers, or junior messengers and trained for a
period not to exceed 30 days before beginning productive work.

"C. PREINDUCTION TRAINING

"Men being trained on an unpaid or paid status in depot or off-reservation schools for depot work prior to their induction into the army. Men trained in this work are to be assigned, upon induction to Air Service Command. This training may be either preemployment or mechanic learner courses.

"2. IN-SERVICE TRAINING.

"A. ORIENTATION TRAINING.

"Specialized new employees as well as newly trained personnel can be oriented in the specific occupation by on-the-job training and by supplementary class training, or both.

"EXAMPLE: Training in shop rules and regulations for new employees unaccustomed to using them.

"B. PRODUCTION TRAINING.

"This type of training is used where the number to be trained is not sufficient to warrant a formal organized course. Inexperienced new personnel assigned to advanced personnel do the work under guidance and finally perform the work alone.

"EXAMPLE: Training of instrument painters or rotor balancer machine operators (gyro instruments), heat treaters, engine case painters.

"C. UPGRADE TRAINING.

"(1) Training for More Responsible Positions.

"Training to develop selected personnel for more responsible positions. This training may be accomplished by on-the-job training or by supplemental class training, or by a combination of the two.

"EXAMPLE: Preparing a radial engine crankshaft assembly for shift leader's duties.
"(2) Training for Improvement Within Rank.

"The objective of this type of training is to develop an employee into a better specialist. This training may also be carried on by on-the-job type training (assignment to experienced personnel), or supplementary training (Organized formal class instruction).

"EXAMPLE: Training a lathe operator to become a more skillful lathe operator.

"(3) Combination Specialist Training.

"This type of training trains an employee in two or more blocks in the specialty field as in the course for Aircraft Generator Specialist a trainee may be trained originally in the E-5 generator block and later in the block for the M-2 generator. In this case, he would be a two block specialist in generator overhaul.

"(4) Cross Training.

"Cross training involves the training of personnel in work in distinctly different departments or occupations.

"POLICY: It is not the policy of Air Service Command to approve cross training, if the basic information from one occupation does not aid or supplement the other occupation.

"EXAMPLE: Hydraulic specialist training in lathe operation.

"3. INSTRUCTOR TRAINING.

"Instructor training includes the development of skill and technical knowledge, as well as the development of teaching skills and techniques. There are two main types of instructor training—the training of new instructors and the upgrading of present instructors.

"Instructor training will also be provided for instructors working part time in the training program, and part time in the depot work."
"4. MANAGEMENT TRAINING."

"Management training involves the techniques of handling employees, their work schedules, new developments in aircraft maintenance, and 'on-the-job' instruction. Upgrade training for present supervisors, as well as the training of new supervisors, are both parts of the management training program." (4)

The method of carrying out these objectives is illustrated by the organization of their course outlines:

"Title. The title includes in most cases the term 'specialist' to emphasize the narrowness of the specific occupation for which the course is designed.

"Introductory Paragraph. This paragraph describes some of the reasons for specialization and recognizes possibilities for some variance in local situations.

"Purpose. Self-explanatory.

"Duration. This paragraph calls attention to the fact that each trainee is an individual. Each will progress at varying rates and the training should be organized accordingly. The duration of the training will depend on individual progress instead of spending an arbitrary amount of time in training.

"Program. This is a description of how the course material is organized and its objectives. Because the purpose of these outlines is to provide training for additional specialization of occupations, the 'block' system is frequently used to allow an individual to be trained in a small unit of work if his future production work job requires it, or to allow him to learn two or more units when more time is available. The outlines also provide for future upgrade training on part-time basis according to interest, ability, and personnel needs. The block type program provides sufficient flexibility to make it readily adjustable to any training requirement. The flexibility will be in the number and combination of blocks rather
PLATES 17 AND 18

MANAGEMENT TRAINING

These plates emphasized the concern the Air Forces had for each individual. The supervisors were taught to personalize their work as much as possible.
YOU HIRE THE WHOLE MAN—

...NOT JUST THE WORK HE DOES FROM 8 TO 5!
TELL 'EM Why-

DON'T JUST TELL 'EM

SUPERVISOR

MAKE 16 COPIES
than in their content.

"Courses and Texts. It is considered necessary for most courses that trainees receive instruction in one or more related subjects which are listed in each outline together with the sources of information for them. Technical Data Section, Maintenance Division, Headquarters, Air Service Command, is preparing the instructional material for these subjects. Technical Manuals and Technical Orders are available through regular channels for on- or off-reservation training programs.

"Orientation. Every trainee needs orientation in the organization in which he works. He needs to know his place in the organization and what he is expected to contribute to it. There are certain basic facts and items of information which trainees should acquire. Because most of these items of interest and need are peculiar to each depot area, this information should be prepared by the control depots.

"Technical Information. Because of the extreme specialization of many of the courses little technical information is required in the mastery of the material covered, but in others considerable technical information is required to make efficient workers. This section is designed to suggest in topic form only such items of technical information that the trainees must know. Order of listing has no significance as any item or part of any item is to be taught when needed.

"Reading Air Corps Drawings. The need for developing ability to read Air Corps Drawings varies widely from course to course. Only in those courses where training for job specialties requires that ability, and only to the extent that they require it, is this subject included. Training in reading Air Corps Drawings should be specialized according to the requirements of the occupations, such as machinist, aircraft sheet metal worker, and aircraft electrician.

"Shop Training. This covers the work assign-
PLATES 19 TO 21
TECHNICAL MANUALS

These plates show some typical formats for text material.

Plate 21 (Fig. E, J-8) had all of the carbon dioxide supply lines printed in red.
With the next finger, raise the latch until it is fully opened.

Now the backplate is unlatched.

By raising the hand it will be found that the backplate can be lifted up and slid out. Lay it aside carefully. Remove the driving spring and stud bolt, so that the bolt may be removed.

Grasp the extractor. Pull back on it. This will cause the bolt inside the gun to be released and to slide backward. Continue to pull back on the ejector until the bolt slides backward, to the point where the stud enters the stud hole (or enlargement) in the slot. (See drawing.)

TO REMOVE BOLT.

Place a screwdriver between the head of the driving spring and the case. Pry the spring gently away from the case until the spring releases and frees itself.

Draw out the spring with your hand.

Take the stud out of the stud hole.

Now let the extractor drop down into its former position.

Figure D

Figure D shows how pictures and reading material are being closely associated as a unit on the same page.
4. Install Top Dead Center Indicator No. 2057 in No. 6L intake spark plug bushing.

5. Install Propeller Shaft Wrench No. 250450 and turn propeller shaft in direction of normal propeller rotation until No. 6L piston coming up contacts arm of Top Dead Center Indicator. Continue to turn propeller shaft carefully until pointer of indicator reaches a pre-selected mark (preferably zero "0" as shown in Fig. 4).

6. Loosen clamp and turn timing disc until "T.D.C." or "0°" mark of inner scale is exactly under pointer and again tighten clamp, Fig. 4.

7. Continue to turn propeller shaft in normal direction of rotation until pointer of Top Dead Center Indicator passes lowest point of travel (highest point of piston travel), Fig. 5, and returns to same pre-selected mark, Fig. 6.

8. Check reading on timing disc as indicated by pointer, which may be 40° as shown in Fig. 6.

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Figure C
Figure E
ments which a trainee must learn to do and learn to do well enough that upon transfer to production work he can assume his duties with a minimum amount of trial and error and supervision.

"As explained above, many courses are set up on the block system. This provides convenient terminal points of training when employment needs demand. Trainees should not be withdrawn from a training course prior to completion of the block covering the work to which he will be assigned for production.

"Production Work. This work shall be done only after the trainee has completed the training block covering the material on which he is to work.

"The production must be in the block or course in which the trainee is being trained.

"For example, after completion of the E-5 generator block the trainee may overhaul several E-5 generators which will be returned to the Engineering Department.

"The purpose of this production work is for training. The same standards of quality shall govern training production work as ordinary production work, but to maintain this standard the trainee will work at the speed commensurate with his training level. The trainee shall be given only sufficient repetition in production units to give him the efficiency necessary to meet standards established for his specialty." (4)

The mastery of minimum essentials is facilitated by the use of Informational Guides as shown in the following statement:

"The mastery of 'minimum essentials' for most of the specialized occupations found in Depot, Sub-depot, and Off-Reservation Civilian Training Programs requires the trainees to learn and understand many items of technical and related information that are not given in the
PLATE 22
OUTLINE OF THE TRAINING COURSE FOR A
SHIPPING TICKET CLERK
Outline of Training Course

1. PURPOSE.
   To train selected individuals in the duties and responsibilities of a shipping ticket clerk, and to give them the necessary information.

2. DURATION.
   Only sufficient time will be given each trainee to complete in a satisfactory manner the contents of this course.

   Approximate time for this course will be 30 hours, including time spent in part-time work in the Depot Supply Department.

3. PROGRAM.
   This course of instruction is selected from the field of property accounting in Depot Supply. It is not a broad basic nor an orientation course, but a specialist course. Trainees will be taught only the skills and understandings that are essentially needed by them to perform their work satisfactorily.

   This work is based on job activities performed by shipping ticket clerks.

   Each trainee will be given the opportunity to spend part of his time in practical training in the Shipping Ticket Unit of the Property Accounting Section of the Depot Supply Department.

4. GENERAL OUTLINE OF INSTRUCTION.
   a. Orientation.
      (1) Explanation of course, its intent and purpose.
      (2) Depot organization and regulations.
      (3) Army Air Forces Regulations affecting Shipping Ticket Unit.

   b. Supply Procedure for Shipping Ticket Unit.
      (1) Purpose and use of Shipping Ticket No. 104A, Store Charge No. 81.
      (2) Form, organization, language, and procedure used in preparing: Military letters, indorsements, immediate action, nonmilitary transmittals, radiograms, notes included on shipping tickets and store charges.
      (3) Filing system used in Shipping Ticket Unit for suspense and completed vouchers.
      (4) Knowledge and understanding of voucher register.
      (5) Purpose and use of the following directives: Army Regulations, A.A.F. Regulation, Air Corps Directives, memos, relating to Shipping Ticket Unit.
      (6) Need and use of a local memorandum file.
      (7) Purpose and use of the Air Corps Directory.

   c. Coordinating Units.
      (1) Limited understanding of A.S.C. organization with emphasis on Depot Supply.
      (2) General familiarization with the Property Accounting Units and Shipping Section of Depot Supply.

   JOB TRAINING

   1. Check shipping ticket and store charge for:
      (a) Addresses.
      (b) Voucher numbers.
      (c) Signature.
      (d) Shipping date and method of shipping.

   2. Route and distribute.
      (a) Shipping ticket.
      (b) Store charge.

   3. File.
      (a) Shipping ticket.
      (b) Store charge.

Technical Orders they use. These minimum essentials, of course, can be obtained from many sources but would mean the loss of much time on the part of each trainee to acquire them. Also, the limited amount and kind of information he needs and the shortness of time that is often available for him to get it, make it imperative that everything he needs be sifted, weighed, and collected for him into one source for ready reference and use. "(4)

The Air Service Command further strove to accomplish its objectives by means of special Instructor's Guides:

"Because of the ever-increasing shortage of trained and experienced instructors, it is necessary that every possible assistance be provided instructors. For this reason, Instructor's Guides are being prepared for each specialized occupation for use in connection with Technical Orders, Informational Guides, and Work Guides. Instructor's Guides are designed primarily for use in shop training and classroom work, but can also be used to advantage by foremen and supervisors on the job training.

"These Instructor's Guides will contain the following information:

"1. Outline of the training to be provided for the specialized occupations.

"2. An expansion of this outline describing training units arranged in instructional order.

"3. For each training unit, suggested methods for developing the particular skill or knowledge.

"4. Suggested shop layouts and classroom arrangements.

"5. For each training unit, specific references to Technical Orders, Informational Guides, reference books, charts, training films, and film strips.

"6. Outlines of shop talks and demonstrations.

"7. Work assignments including suggested productive work."
PLATES 23 TO 28

SUGGESTIONS FOR INSTRUCTORS

The Air Forces not only gave their instructors specific job information but they also gave them specific suggestions on teaching procedures as illustrated in Plates 23 to 28.
I. HOW LEARNING BEGINS

A. LEARNING BEGINS WHEN WE SEE, HEAR, FEEL, SMELL, OR TASTE SOMETHING.

All of these experiences of the senses make impressions on our minds. Even now, you can remember the strong impressions of your childhood, such as your first sight of a strange city or the sound of a machine gun in the movies. Seeing and hearing are the senses most often used in learning. Less important are feeling, smelling, and tasting.

Since getting an impression is the first step in learning, you want to understand exactly how trainees can be given strong impressions.

Most of our new impressions come through the eye. The printed page of book or newspaper, the picture on the screen, writing on the blackboard, a chart or diagram, a machine in operation—these and hundreds of other impressions come to us in a classroom or shop because we can see them. Eyes, then, are all-important. If what we see is clear and vivid, we learn more effectively.

Hearing is next in importance to seeing, in the impressions we get. The radio, the voice of the instructor or of a fellow workman, the steady purr of a well-timed engine, the chatter of a cutting tool, the rattle of a loose bolt—sounds like these come to have special meanings to the trainees who have listened to them.

We learn more through our sense of touch or feeling than we would ordinarily believe. The "feel" of a micrometer or the "drag" of a caliper means something to the machinist.

The "touch" of the typewriter, the tightness of a bolt, the roughness of a surface, the vibration of a machine are impressions that may be connected with our learning. For instance, we soon learn how the steering wheel feels when one of the front tires on the car begins to go flat.

Less important are smell and taste in giving us impressions that are important for learning in the classroom or shop. The electrical worker soon learns the meaning of the smell of burning insulation. The odor and taste of food are likewise important to the cook.

These messengers of the mind—seeing, hearing, feeling, smelling, tasting—give us impressions. If two or more kinds of impressions arrive in the brain at the same time, we learn more easily. For example, if an instructor tells us about a machine at the same time that we watch it work, we learn more quickly than if we hear about it without seeing it. It is also true that some single impressions are more vivid than others. You may not remember a black-and-white picture of the Grand Canyon of the Colorado; but the same picture tinted would probably stick in your mind. We learn best, then, if the impression is vivid, and if it comes through two or more of our senses.

B. LEARNING IS ALWAYS BUILT ON WHAT WE ALREADY KNOW

Learning is like building a house—we start with the foundation rather than with the roof. We cannot build the roof until the walls are there to support it. In learning, we start with the simple, fundamental knowledge before we go on to new and difficult problems. Before we can do stunt flying, we have to master ordinary flying.

Figure 8—Start with the foundation and build upward
Chapter 3

You may actually conclude the lesson in a number of ways. Perhaps it will end with a test. On the other hand, you may think that a brief summary would emphasize the important points for them. This summary can be made interesting and forceful if you refer to the illustrations which you used in the presentation step. You may then want to tell the trainees something about what they are going to learn next, and how it ties in with what they have just learned. Challenge their interest in what is coming next. Give them a chance to ask questions about it if you have time. If you have an assignment for them, be sure that they understand what they are to do and how they should do it. Assignment sheets will save class time, since you need not repeat detailed directions to be found on the sheets.

One of the tests of a good instructor is his ability to time the parts of a lesson so as to provide a good closing. Trainees are quick to sense the confusion if they must stop in the middle of an exercise or lecture, or if you shout last minute directions at them on their way out of the shop or classroom. When you have had enough experience so that you can round out the lesson adequately and at the proper moment say, “Class dismissed,” you can feel proud of your achievement.

III. METHODS OF PRESENTATION

Although the discussion of teaching methods in the following pages is divided into Lecture, Demonstration, Illustration, Drill, Discussion, Conference, and Questioning, you will probably use two or three of them in every lesson. You have probably watched an instructor who lectured for five or ten minutes and then pointed to charts to illustrate. He may have stopped to ask questions before he demonstrated how to do the thing. Finally, he probably drilled the trainees in the new skill or knowledge. At other times, as in many type-writing classes, the entire lesson is drill work to fix the habits of the trainees. From your own experience, you can understand how one teaching method can be used for one lesson, or how several methods may be better for another lesson. Let us now consider each method separately. It will be up to you to put these methods together according to your needs in actual instruction.

A. THE LECTURE METHOD

Telling your trainees what you want them to know is a natural and necessary way of teaching. Every time you stop to explain something to a trainee at work, you are giving him a little talk which might be called an informal lecture if it were expanded and given to a larger group. When you comment on silent films which your trainees are watching, you are giving a lecture of a special kind. You will also find it necessary to talk to the trainees while you are demonstrating. Thus, you are using the lecture method whenever you talk to the trainees.

In combination with demonstration, illustration, drill, and discussion, the lecture method is valuable because the trainee hears, sees, and does something. By itself, the lecture is limited because the trainee only hears about something.

Though you may never give a formal lecture to your trainees, you can use the suggestions in this chapter for lectures or talks to improve your demonstrations, illustrations, drills, and discussions.

1. VALUE OF THE LECTURE METHOD.

If you use the lecture to supplement other methods, and if you talk in an interesting, lively manner, this method has several advantages:

a. You can arouse interest among the trainees for a new subject.

b. You can give them extra information, particularly material that is not available in any other form.

c. You can present much material in a short time to a large number of trainees.
2. DISADVANTAGES OF THE LECTURE METHOD.

a. If it is not used in connection with other methods—
   (1) It may be hard for you to discover whether the trainees understand as you talk. They may not even be listening at all!
   (2) When the trainees do not use the new information either by thinking, reciting, or doing, they are learning nothing.

b. If the lecture is carelessly prepared—
   (1) You may waste time by rambling over poorly organized material.
   (2) You may talk too long. Few of the trainees will listen carefully after twenty minutes.

c. DO NOT USE TALKS OR LECTURES.
   (1) To teach material that trainees must grasp thoroughly and in detail.
   (2) To teach a skill.

3. HOW TO USE THE LECTURE METHOD.

Though this method permits you to talk informally, it nevertheless requires careful preparation. You must not chatter on about anything that comes into your head during your explanation. On the other hand, you need not be stiff and formal. The best solution is to prepare your material so carefully that you can talk conversationally but pointedly. The best speaker aims to give well ordered points in a conversational, easy manner. The steps in your preparation for a short talk are few, but they cannot be rushed.

a. Decide exactly what points need to be covered in this instruction period.

b. Look up the best material available on these points in books, manuals, technical orders.

c. Arrange your material in some clear order. For example, you can describe airplane engine models according to the type of engines, or you can give them according to the time of production, beginning with the most recent and going back, or beginning with earliest models and coming up to the present.

Be sure that the order of these divisions serves the purpose of the particular lesson, and that you keep them distinct by telling the trainees when you have finished discussing one and what you intend to explain in the next.

d. Jot down the points and the material that you intend to cover. A list or outline on a card or slip of paper is easy to glance at while you are talking. Do not write out whole sentences and paragraphs, or you will find yourself reading instead of talking to the trainees.

e. Run through the little talk several times so that you get used to it. If you omit an important explanation, make sure that you put a reminder of it in your outline. If you ramble on, time yourself for each rehearsal until you know exactly how much you can include. If you hesitate and have long silent stretches, you may need to know your material better and to practice aloud more frequently.

When someone talks to you from a platform or in conversation, you expect him to be direct and interesting. Your trainees expect you to speak well, and they will listen better when you do. Talk to them, look at them as you would in conversation. Start out with an interesting story or a startling fact. Tie each point to the trainee's experience; illustrate it with an example, or with some visual aids; watch their faces to find out when they understand. Then, go on to the next point. At the end, summarize. Allow time for them to ask you questions, and for you to ask them questions. This exchange of questions will cause them to listen more carefully and to learn more rapidly and surely.

B. THE DEMONSTRATION

In the demonstration lesson, the trainees are shown what you want them to learn as a result of the lesson. Usually, you show them how to do something with the tools, equipment, and materials that they will use on the job. You may demonstrate how to do a piece of work while you explain each step to the trainees. For example, you might operate a spray gun on the fabric surface of an airplane wing or rudder while your trainees watch you. As an instructor in guard duty, you might show the trainees how to hold, aim, and fire a pistol.

You will find the demonstration method has many advantages. First, demonstration aids learning by using at least two sorts of sense impressions, seeing and hearing. Since the trainee can see as well as hear about the skill or operation being correctly performed by you, his impressions are likely to be clear and more lasting. Moreover, all trainees regardless of age or ability can watch and usually understand a careful demonstration.
Besides, a demonstration attracts their attention and usually holds their interest. By providing something for the beginner to imitate, the instructor proves that the thing can be done according to his directions. In other words, a good demonstration is convincing as well as stimulating.

Still other desirable features account for the frequent use of demonstration in the classroom or shop. It can be used with a group of reasonable size or in individual instruction. In combination with other methods of instruction—lecture, drill, discussion—demonstration adds clarity and interest.

Since information and skills usually are presented at the same time, the demonstration is an excellent method of getting the trainees ready to practice doing the skill, operation, or process being discussed. In this way, learning takes place when trainees are likely to be warmed-up and in good mental condition for learning.

1. WHEN TO USE DEMONSTRATION.

Demonstration will be useful to you in almost every period. You should use it whenever possible in the following situations:

a. To show a trainee how to do an operation, and how to develop skill in performance. For example, in showing a trainee how to tighten the joint of a tube with a fitting, you would actually use a wrench while he watched you. (See figure 25.)

b. To show a trainee how equipment and tools operate. For example, you could operate a valve reseating tool to recondition a valve seat in the cylinder barrel of an aircraft engine. (See figure 26.)

Some of these demonstrations will take place in the classroom or shop where you can easily demonstrate for an individual trainee or for a group. Away from the job, you can demonstrate if you can move enough equipment from the shop.

In connection with other kinds of lessons, you can use demonstrations very effectively. Here are some suggestions:

1. Trainees will understand a short lecture better if parts of the material can be demonstrated.
2. Drill or practice work should be introduced by demonstration so that the trainees understand exactly what they are to do.

2. PLANNING THE DEMONSTRATION.

No matter how familiar you are with the demonstration, careful planning is important if the lesson is to be successful. As you might expect, your lesson plan will include the objective of the lesson; the purpose of the demonstration; a list of the necessary equipment, tools, and materials; an outline of the steps in the demonstration; and the important points to be emphasized.

Several rehearsals of the demonstration will help you do it more smoothly for the trainees. Here are some suggestions about these rehearsals:

a. Set up the necessary tools, equipment, and materials. Everything should be in readiness so that the demonstration need not be interrupted while you search for tools.

b. Time the demonstration. If it lasts more than fifteen or twenty minutes, better break it into smaller parts.

c. Arrange the equipment so that the light is good. There should be neither glare nor shadow.

d. Decide where the trainees will be. They should be able to see and hear easily during the demonstration.

3. WARM-UP FOR THE DEMONSTRATION.

At the beginning of the actual lesson, when your materials and equipment are in readiness, your first thought must be of the trainee. You will want to tell him the connection between this lesson and what he has learned before, and the usefulness or importance of learning this new operation or skill. To hold his...
attention throughout the demonstration, you tell him what points to watch most carefully. A list of questions will direct his attention to the important steps of the demonstration and provide an easy check-up afterward.

4. THE DEMONSTRATION ITSELF.

In this part of the lesson, you are likely to be telling the trainee about the operation at the same time that you are doing it. For that reason, careful planning about what points need explanation will prevent you from including aimless remarks that are not needed for a clear understanding of this operation. No matter how interesting such unrelated information may be, you should rigidly exclude it from your explanation lest your trainees be confused or distracted. Nevertheless, what you tell them should hold their interest. The best way to keep them alert is for you to speak clearly and enthusiastically.

When the trainees are ready for the presentation, you can group them around the table or machine or blackboard so that they all can see and hear the steps of the demonstration. If there is any danger, they should be a safe distance from the machinery. Now state the purpose of the demonstration and explain its process. For example, you could say:

"Here are the parts of an aircraft B.G. spark plug. In a moment, I am going to show you how to treat the parts with anti-rust oil, and later how to assemble them. We have 1000 spark plugs like this one on hand. This morning we received an order to treat them with anti-rust oil and to have them assembled and ready for shipment as soon as possible."

For the actual demonstration, you may find the following suggestions helpful:

a. If the trainees are not experienced in any of the parts of the demonstration, you should go through the complete process at normal speed. This sort of demonstration gives them an understanding of the whole and insures their continued attention.

Then repeat the demonstration slowly, explaining each step so clearly that the trainee gets a full and vivid impression.

It is a good idea to finish by going through the process at normal speed with any necessary explanations.

b. If the trainees are experienced with some of the operations, you can ask one or more of them to do the familiar part of the process. This will give one or more trainees additional practice and hold their interest. In the meantime, you can ask rapid fire questions to keep the other trainees alert.

c. If the trainees are to develop proper habits or skills in a short time, you must follow the accepted methods in your demonstration. Their first imitation should be done correctly.

You may ask one of the trainees to record on the blackboard the important steps in the order of their occurrence during the demonstration.

d. Emphasize any safety precautions at the time of demonstrating a step or operation that contains an element of danger.

e. Ask questions during the demonstration to guide learning and keep attention fixed on the process.

Encourage the trainees to ask questions as you repeat the demonstration.

f. Summarize the important steps in the process, and emphasize the key points in each.

Figure 27—The trainee applies what he has learned.

5. APPLICATION OR TRY-OUT BY THE TRAINEES.

Immediately after your demonstration, ask the trainees to go through the process you have just shown them. Provide them with materials like those you used, and if possible, like those used in a real job of production.

Pay particular attention to the trainees who find the work difficult. If you notice one of them making a mistake, call his attention to it and show him the correct way. Otherwise, he may get into the habit of doing the operation in the wrong way. For example, a trainee who holds a file incorrectly should be shown the proper way immediately. Or, when a trainee fails to grasp one of the steps, that part of the process must be demonstrated to him again. If several of the trainees are uncertain about a few steps in the process, you can call
them together and demonstrate again. You can sometimes find out how well they have learned by asking questions.

One good way of encouraging trainees of superior skill is to ask them to demonstrate if the less competent ones need a repeated demonstration. They can also help the slower trainees to learn correctly. While the skillful trainee is helping or demonstrating, make sure that he is going through the process correctly.

6. TESTING AND FOLLOW-UP OF DEMONSTRATION.

Although you will find detailed recommendations for testing in a later chapter, you will probably check up on the trainee's learning by finding out after the demonstration whether he can perform the operation successfully, by asking him questions to see if he understands it. Finally, the trainee should have an assignment which will provide practice by requiring him to repeat the operation.

C. THE USE OF ILLUSTRATION

1. IF YOU CANNOT DEMONSTRATE, ILLUSTRATE.

If you do not have the equipment, machines, or tools for a demonstration, you can substitute visual aids, such as charts, blackboard sketches, and films. In connection with an interesting talk, this illustrative material will give the trainees some understanding, though it will not teach them skills. As a substitute, it is best suited to advanced trainees who have some background and experience in the course. For example, advanced trainees might learn the names of the parts or operations of an automatic pilot if the equipment itself was unavailable, or unhandy to move. You would tell them about the automatic pilot, and you could show them a model with cut-away sections showing the parts and construction.

In addition, you could use blackboard diagrams, charts, and film strips to make the parts or operations of the automatic pilot clear. (Figure 28.)

If materials or essential equipment are very scarce, you can still make your lesson interesting and vivid. For example, in instructing trainees about the operating principles of a gun turret, you may use training films, film strips, charts, or diagrams instead of the actual gun turret.

2. SELECT YOUR ILLUSTRATIVE MATERIAL WITH CARE.

Be sure that you have some way of showing each item you want to teach. Perhaps one picture, mock-up, cut-away, or diagram will illustrate only part of your lesson. Do not stretch such material to include other points you wish to make; instead, find good material that will apply illustrate the other points. For example, a model of an engine would not show the flow of gas from fuel pump to injector carburetor; but if you added a blackboard diagram, the illustrative material for your lesson would be complete and clear.

It is also a good idea to illustrate one point in as many ways as possible. Some trainees most easily understand pictures; others catch the idea from charts or diagrams. It is better to make one item clear with a number of illustrations than to limit yourself to one sort of illustration for many points.

3. SHOW YOUR ILLUSTRATIONS ONLY AT THE TIME YOU USE THEM IN THE LESSON.

Keep your charts, pictures, or diagrams covered or reversed until you are ready to use the material. Keep the blackboard clear or covered until you are ready to emphasize a particular point by writing or drawing on it. After the trainees have copied or used the drawings, diagrams, or outlines on the blackboard, erase them so that they will not attract the trainees' attention when you are dealing with some other material.

KEEP IN MIND THAT THE ONLY PURPOSE OF ILLUSTRATING IS TO EMPHASIZE OR MAKE CLEAR THE POINTS OF YOUR INSTRUCTION. The use of illustrations is further developed in Chapter 9.

D. PRACTICE OR DRILL LESSON

In the practice or drill lesson, the trainee learns by exercising a skill under your direction. Each trainee gets his instruction and tries it out at once, while you guide and correct his efforts. He then repeats the process thoughtfully until he can do it quickly and well.

Lives may depend on the successful use of the practice method. For example, a parachute rigger must learn his job by actually packing real chutes. Over and over he goes through the process until he does it correctly (figure 29).

In such a situation, the trainee is learning by doing. Practice is at its best when the trainees use real materials, real machines, and production methods. Then, the trainees should be tested by production standards.
"8. Suggested use of Work Guides for the particular specialized occupations.

"9. Progress charts for each specialized occupation and their use.

"10. Photographs of mock-ups, cut-aways, and other training aids.

"11. Performance, oral, and written tests to determine trainees' progress." (4)

The Air Forces also recognized the importance of the human side of training in the language studies. Here attitudes and appreciations played an important part. For example, in the Greek Language Guides the trainee was informed that:

"Knowing a little Greek will also help you get along with the people, for they will naturally be pleased to see a stranger showing enough interest in them to try to learn their language." (53)

Hugo Giduz, in the December 1944 issue of French Review (24), told how students in their French "area" study spent considerable time on the culture, civilization, history, and institutions of France. The poorest students, according to Giduz, received a course spoken in the French language on French civilization.

b. Conclusions:

A comparison of some of the Army Air Forces objectives and plans with the definitions which were quoted for education and training shows that there were elements of both education and training present. A further study shows
These two plates illustrate how the Air Forces attempt to eliminate disturbing mannerisms from the teaching staff.
(2) A few examples of these damaging habits are presented here, but many more will be brought to your attention on later pages of the guide.

(3) Check yourself as they are mentioned to see if you think you have formed any of them.

(4) Then reflect a moment and recall instructors under whom you have studied who were addicted to these habits and remember how they interfered with your concentration under those instructors.
that the basic objectives were those dealing with knowledge, appreciations, attitudes and skills with the greatest emphasis upon skills, especially of the manipulative type. Also the general plan showed a constant effort to specialize in those skills which were taught each trainee. There was a striving for definite but limited goals as shown by the following statement of Lt. Greer, formerly with the State College in San Diego, California:

"The objective of the pilot training program is relatively narrow........The subject matter whether intensive or extensive should be directed toward developing and reinforcing a relatively small number of basic skills or understandings."

(26)

3. Some Objectives of Education in the Public Schools:

a. General objectives of education.

b. Objectives of various subject matter fields in public schools.

Many volumes would be required to quote from all the studies which have been made on the general objectives of education and on the objectives of specific subjects taught in the public schools. Consequently this paper will allow space for only a limited number of typical quotations from the various fields.

The bases for selection of these quotations were:
(1) Recentness of the publication.

(2) Give a rather high priority to state courses of study because they represent what is actually being done or advocated in the schools today.

(3) Quote from textbooks on how to teach specific subjects.

(4) Consider the present occupations of the writers and give priority to those who have the better positions.

(5) Quote those opinions which most commonly appeared in the literature and reject those which differed markedly from the average.

a. General objectives of education.

How are the objectives of education determined for the public schools? This question is answered in the following manner by the Educational Policies Commission of the National Education Association:

"Every statement of educational purposes, including this one, depends upon the judgment of some person or group as to what is good and what is bad, what is true and what is false, what is ugly and what is beautiful, what is valuable and what is worthless, in the conduct of human affairs. Objectives are, essentially, a statement of preferences, choices, values. These preferences are exercised, these choices made, these values arranged in a variety of ways.

"The purposes of schools and other social agencies are not 'discovered' as a prospector strikes a gold mine. They evolve; they reflect and interact with the purposes which permeate the life of the people. In each of the phases of individual and social living, there are
elements which people commend, others which they condemn. Such judgments are based, in the last analysis, on moral standards or ideals. That which, out of their intelligence and experience, the people declare to be good, they will attempt to maintain and perpetuate for the benefit of their children and their children's children. They strive through education to transmit what they think is good to all the generations to come. ......Educational purposes, then, are a form of social policy, a program of social action based on some accepted scale of values. Since the application of these values varies from place to place and even from day to day, detailed purposes of education can never be developed so as to be universally applicable and perpetually enduring. Constant study and revision are required to keep them meaningful to the people and effective in the schools." (20)

Educational leaders for many centuries have attempted to classify the aims of education in terms of the values which they believed were important, but the modern trend of classifying objectives in terms of human activities was popularized by Herbert Spencer in 1860. He listed five major classes of human conduct:

"(1) Self-preservation, (2) securing the necessities of life, (3) the rearing and discipline of offspring, (4) the maintenance of proper social and political relations, and (5) the activities which make up the leisure part of life, devoted to the gratification of the tastes and feelings." (48)

One of the most outstanding attempts to state objectives in terms of activities came from a teacher's group in 1918. Their objectives were included in the "Report of the Commission on Reorganization of Secondary Education of the National Education Association." Their list, known as the "Seven Cardinal Objectives of Educa-
"(1) Health, (2) command of the fundamental processes, (3) worthy home membership, (4) vocation, (5) citizenship, (6) worthy use of leisure, and (7) ethical character." (54)

A few years later Chapman and Counts listed "six great interests about which human life revolves." They believed that men must always,

"(a) Care for their bodies, (b) rear their children, (c) secure the economic necessities, (d) organize for civic action, (e) engage in recreation, and (f) satisfy their religious cravings." (14)

The Department of Superintendence of the National Educations Association's Sixth Yearbook reduced the objectives to four, namely:

"The individual self, nature, society, and God--these four and in particular the adjustments which the individual self must make--constitute the objectives of education." (35)

A more detailed list is given by Bobbitt in his book, "How to Make a Curriculum." He listed the following ten objectives:

"(1) Language (social intercommunication), (2) health (physical fitness), (3) citizenship, (4) general social activities (meeting and mingling), (5) spare time activities (amusements and recreation), (6) mental fitness, (7) religion, (8) parental, (9) unspecialized or non-vocational practical activities, and (10) vocational activities." (9)

The last set of objectives which will be listed here are those by the Educational Policies Commission of the National Education Association, 1938. They said that
In general, their list differs from the others in that they have made more of an attempt to organize the objectives in terms of the activities of a growing child. Thus the child's first concern is of himself, then he becomes aware of his home and family, next his wants go beyond the home and he is concerned with consuming and his ability to earn. Lastly, he becomes a member of society and world organizations. The Educational Policies Commission next broke down each of these four major objectives into about ten subheads. Their complete list is as follows:

"The Objectives of Self-Realization.

"The Inquiring Mind. The educated person has an appetite for learning.

"Speech. The educated person can speak the mother tongue clearly.

"Reading. The educated person reads the mother tongue efficiently.

"Writing. The educated person writes the mother tongue effectively.

"Number. The educated person solves his problems of counting and calculating.

"Sight and Hearing. The educated person is skilled in listening and observing.

"Health Knowledge. The educated person understands the basic facts concerning health and disease.

"Health Habits. The educated person protects his own health and that of his dependents.

"Public Health. The educated person works to improve the health of the community.

"Recreation. The educated person is participant
and spectator in many sports and other pastimes.

"Intellectual Interests. The educated person has mental resources for the use of leisure.

"Esthetic Interests. The educated person appreciates beauty.

"Character. The educated person gives responsible direction to his own life.

"The Objectives of Human Relationship.

"Respect for Humanity. The educated person puts human relationships first.

"Friendships. The educated person enjoys a rich, sincere, and varied social life.

"Cooperation. The educated person can work and play with others.

"Courtsey. The educated person observes the amenities of social behavior.

"Appreciation of the Home. The educated person appreciates the family as a social institution.

"Conservation of the Home. The educated person conserves family ideals.

"Homemaking. The educated person is skilled in homemaking.

"Democracy in the Home. The educated person maintains democratic family relationships.

"The Objectives of Economic Efficiency.

"Work. The educated producer knows the satisfaction of good workmanship.

"Occupational Information. The educated producer understands the requirements and opportunities for various jobs.

"Occupational Choice. The educated producer has selected his occupation.

"Occupational Efficiency. The educated producer succeeds in his chosen vocation.

"Occupational Adjustment. The educated producer maintains and improves his efficiency.

"Occupational Appreciation. The educated producer appreciates the social value of his work.

"Personal Economics. The educated consumer plans the economics of his own life.


"Efficiency in Buying. The educated consumer is an informed and skillful buyer.

"Consumer Protection. The educated consumer takes appropriate measures to safeguard his interests.
"The Objectives of Civic Responsibility.

"Social Justice. The educated citizen is sensitive to the disparities of human circumstance.

"Social Activity. The educated citizen acts to correct unsatisfactory conditions.

"Social Understanding. The educated citizen seeks to understand social structures and social processes.

"Critical Judgment. The educated citizen has defenses against propaganda.

"Tolerance. The educated citizen respects honest differences of opinion.

"Conservation. The educated citizen has a regard for the nation's resources.

"Social Applications of Science. The educated citizen measures scientific advance by its contribution to the general welfare.

"World Citizenship. The educated citizen is a cooperating member of the world community.

"Law Observance. The educated citizen respects the law.

"Economic Literacy. The educated citizen is economically literate.

"Political Citizenship. The educated citizen accepts his civic duties.

"Devotion to Democracy. The educated citizen acts upon an unswerving loyalty to democratic ideals." (20)

Conclusions:

The Commission summarized its discussion of objectives with this sentence:

"It should be clear from the preceding discussion that there is no ultimate virtue in any single classification of objectives." (20)

A study of all the above lists of objectives shows that there is a very close similarity. They vary somewhat in emphasis upon different objectives and they express various shades of meaning, but basically they are strikingly similar.
The next question then is: How do these objectives compare with those listed for the Army Air Forces? If the Air Forces condensed list (skills, attitudes, appreciations, knowledge and ability to use it) is thought of somewhat as a list of "tools" for achieving the desired goals, it will be obvious that the same list plays an important part in the general objectives of education for the public schools. A specific application of these tools to one of the above lists of objectives will help to make this point clear:

The Objectives of Self-Realization.

1. The "inquiring mind" is an attitude which involves an appreciation for new things and a knowledge of the benefits which come from learning.

2. Speech, reading, writing, numbers, sight and hearing all lean heavily upon skills.

3. Health knowledge involves knowledge and ability to use it.

4. Recreation. "The educated person is participant and spectator in many sports and other pastimes." In other words he has skill in some and appreciation for others.

5. Esthetic Interests. "The educated person appreciates beauty."

Thus it can be seen that somewhat the same objectives
occur in general education as those found in the educational programs of the Armed Forces. The main distinction lies in the amount of emphasis placed upon the various objectives.

b. Some objectives of various subject matter fields in the public schools.

This section of the paper will first list groups of objectives from the following subject matter fields: Industrial Arts, Mathematics, English and Literature, Modern Foreign Languages, Science, and Social Studies; second, summarize each list of objectives, and third, compare the objectives of one field with those of another.

(a). Objectives of subject matter fields.

(1) Industrial Arts.

The first list of objectives for the Industrial Arts field will be taken from a report of the American Vocational Association. The report states their objectives as follows:

"The primary purpose of education is to develop our young people into happy, useful, and successful citizens. A happy, useful, and successful life involves the possession of certain ideals, attitudes, habits, and accomplishments. The industrial arts work is justified....because the experiences provided in industrial arts offer a more effective and more economical means of developing certain desirable objectives which are given as the aims of general education.......

"It is in the development of attitudes, habits of thought and of practice, which are considered such desirable outcomes of education, that the industrial arts experiences afford the greatest opportunities."
"The Objectives Considered.

1. To develop in each pupil an active interest in industrial life and in methods of production and distribution. The material presented should not be of a highly technical character but should be of such a nature as to arouse interest in industry.

2. To develop in each pupil the ability to select, care for, and use properly the things he buys and uses. Some of the principal points to be considered may be stated as follows:

(a) Conditions in use.
(b) Qualities necessary for satisfaction.
(c) Cost.
(d) Use of the article for the purpose and in the manner intended.
(e) Protection from wear and damage not necessary in use.
(f) Importance of making necessary repairs and adjustments promptly.
(g) The proper care of an article when in use.

3. To develop in each pupil the appreciation of good workmanship and good design.

4. To develop in each pupil an attitude of pride or interest in his ability to do useful things. Recognition of merit, or the service rendered, is of fundamental importance in developing this attitude. It may involve such things as recognition for:

(a) Services performed in the home.
(b) Services performed for the school.
(c) Services performed for himself.
(d) Services performed for other individuals.
(e) Any services which suggest superiority or accomplishment.

5. To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation. This attitude may be developed through:

(a) Familiarity with machines and how they operate.
(b) The ability to use our more common tools.
and materials sufficiently well to meet emergencies.

"(c) Establishing the habit of examining a problem to see what is required before beginning on it.

"(d) Learning to plan and execute problems on one's own responsibility.

"(e) Transacting business.

"(f) Meeting people in social and business intercourse.

"6. To develop in each pupil the habit of an orderly method of procedure in the performance of any task......This may be developed by:

"(a) Requiring a careful examination of all jobs, tasks or assignments before beginning on them in order to find out just what is required.

"(b) Requiring a definite step by step plan for doing the job.

"7. To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not.....The idea of permitting the spontaneous interest of the child to determine entirely what he shall learn or what he shall do destroys the fibre from which men are made.

"8. To develop in each pupil the habit of careful, thoughtful work without loitering or wasting time (industry).....The essential conditions contributing toward it are:

"(a) A definite objective or purpose, clearly visualized and much desired.

"(b) A definite step by step plan for performing the task.

"(c) An emphasis on time as an element in doing the job.

"(d) An accurate method of measuring results which should give consideration to the time element.

"9. To develop in each pupil an attitude of readiness to assist others when they need help and to join in group understandings, (cooperation).....This attitude may be developed through the assignment of tasks which will make necessary:
"(a) Assistance from others.
"(b) Assistance to others.
"(c) Group cooperation.

"10. To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others.

"11. To develop in each pupil a knowledge and understanding of mechanical drawing.

"12. To develop in each pupil elementary skills in the use of the more common tools and machines, and a knowledge of the methods of procedure in tasks frequently encountered by the average man, together with a knowledge of the working qualities and characteristics of some of our most used materials."

Dean Schwerkhard, Commissioner of Education for Minnesota, distinguished between direct and indirect objectives. His list follows:

"In brief, the objectives which may be considered direct, because they can be accomplished more perfectly, and in many cases only by industrial work, are:

"(1) Manipulative skill.
"(2) Industrial knowledge, and
"(3) Domestic intelligence.

The indirect or general objectives not peculiar to this type of school work alone are:

"(4) Command of the fundamental processes.
"(5) Cultivation of individual bents,
"(6) The development of a large number of desirable character traits." (44)

David Snedden, Columbia Teachers College, and W. E. Warner think of the Industrial Arts objectives as experiences. Thus:

"It is under these conditions that we find in Industrial Arts one of the large means of compensating for the deficiencies of environment and for providing growing children with opportunities for experiences which appear to be very necessary to fullest growth and which they cannot otherwise obtain." (47)

R. W. Selvidge's book, "Industrial Arts in Modern
Education" set forth very similar objectives to those listed in American Vocational Association bulletin, "Standards of Attainment in Industrial Arts Teaching."

Three different approaches are used by Ericson of Santa Barbara State College, to determine his objectives:

"The aims for industrial arts in the elementary school may be established from at least three different approaches, namely: (1) the study and manipulation of materials used by man both in the past and present; (2) a means for self expression of the child; (3) a means for stimulating pupils and creating interest in the regular school routine. . . . . .

"Objectives of Industrial Arts in the Junior High School of Los Angeles:

I. General Educational Objectives.

a. To satisfy that desire in every boy to express himself through the medium of tools and materials.

b. To develop handy-man abilities through repair and construction work for home, shop, and office use.

c. To assist in better choice and use of industrial products and services.

d. To gain a sympathetic attitude toward the laboring man, with an appreciation of the importance of his work.

e. To give the boy an avocation or hobby.

f. To develop habits of neatness, orderliness, accuracy, cleanliness, and the like.

II. Exploratory Objectives.

a. To try out individual inclinations and abilities for individual pursuits through typical experience of the various occupations.

b. To make reliable studies of the conditions, demands, and opportunities in related occupations.

c. To appreciate economic production by first-hand experience in productive work.

III. Prevocational Objectives.

a. To extend the try out activity to meet the preparatory vocational needs of the pupil....

b. To provide for individual needs of pupils who would not remain in school for academic education alone." (22)
Friese, Director of Vocational Education, St. Cloud, Minnesota divided the objectives into manipulative and non-manipulative aims:

"I. Manipulative Aims.

"a. To provide opportunity to make and do things they like to make and do.
"b. To provide training in common skills everyone should possess.
"c. To provide trade exploratory or try out experiences in typical trades....

"II. Justifiable non-manipulative Aims:

"a. To provide training in industrial arts and industrial art appreciation (partially manipulative).
"b. To provide a natural medium for guidance, education and vocation.
"c. To provide interesting technical information about the occupation or occupations represented in the school shop, and others closely allied.
"d. To provide studies in vocational economics closely related to everyday life.
"e. To provide organized training in reasoning and problem solving." (23)

Ericson's aims for the junior high school are:

"Accepted Aims for Junior High School.

"1. To give opportunities for satisfying the desire to do things with tools and materials.
"2. To afford opportunities for exploring or trying out a variety of occupational fields....
"3. To give experience with common tools and materials that will be generally useful to everyone (handy-man abilities).
"4. To furnish a body of technical knowledge concerning industrial work and materials used in industry.
"5. To lay a basis for intelligent selection and use of industrial products from the standpoints of both fitness and construction.
"6. To develop an appreciation of the work of men who labor in the industrial world, and a wholesome attitude towards their tasks.
"7. To present a field of possibilities for
worthwhile leisure time pursuits.

8. To widen the students knowledge of occupations through auxiliary studies and related information.

9. To develop appreciation of economic relationships in industrial and business through special study and productive experience.

10. To prolong the educational life of certain students who are encouraged by these special activities to remain in school (vitalize the education program).

11. To give vocational or semi-vocational training to a limited group in order to meet the needs of those who will leave school at an early age." (22)

For the Senior High School he listed three objectives.

1. The vocational.
2. The technical.
3. The managerial objective." (22)

He also showed how the seven cardinal objectives fitted into the industrial arts program.

Conclusions:

It is impossible to find three or four sentences which will completely express all of the ideas and shades of meaning developed in the foregoing list of quotations, but nevertheless certain objectives stand out in all of them. These objectives may be listed as skills, attitudes, appreciations, knowledge and ability to use it. Skills, especially of the manipulative type, get more emphasis than any other. An application of the definitions of education and training also shows that both types of learning constantly appear in the lists of objectives
But that training gets the more emphasis.

(2) Mathematics.

The objectives of mathematics will now be examined. The first list of general objectives are those advocated by the Oklahoma State Department of Education.

"General Objectives in Mathematics.

"1. To learn the mathematics of everyday life.
"2. To acquire, in precise form, those ideas or concepts in terms of which the quantitative thinking of the world is done....
"3. To develop the habit of precise thought and lucid expression.
"4. To appreciate the dependence of scientific and economic progress on mathematics.
"5. To learn logical methods of thinking....
"6. To learn and appreciate the contribution of mathematics to civilization.
"7. To master the mathematical technique necessary for specialized vocations.
"8. To develop proper study attitudes, habits of thoroughness and concentration, appreciation of consistent, regular mental labor.... (56)

The Pennsylvania Department of Public Instruction listed the following objectives for the senior high school.

"The general objectives for the mathematics course of study for the senior high school are:

"1. Continued application of the skills learned in the preceding mathematical courses.
"2. Accuracy and facility in the fundamental processes.
"3. Knowledge and power to apply mathematical concepts....
"4. Specific knowledge of mathematics useful in interpreting economic and social problems.
"5. Development of logical reasoning as it relates to mathematics.
"6. General cultural influence, through ability to interpret life problems...." (38)

Quoted below is a portion of the set of objectives for mathematics from Oregon's Department of Public Instruction.
A. Essential Abilities.

1. The ability to use mathematical procedures in practical life situations.

2. The disposition and ability to use reflective thinking in the analysis and solution of problem situations.

3. The ability to study and learn effectively.

4. The ability to earn a living for oneself and his dependents.

5. The ability to function as a discriminating consumer.

6. The ability to utilize leisure through a variety of enjoyable, worthwhile activities.

7. The ability to cooperate intelligently and effectively in the affairs of a democratic society.

8. The ability to read and understand materials involving mathematical concepts and terminology.

9. The ability to express oneself forcefully, clearly, and correctly in situations involving quantitative relationships.

B. Basic Understanding.

1. An understanding of the ways in which the science of mathematics has transformed man's modes of thinking and living.

2. An understanding of quantitative concepts and relationships.

3. An understanding of the relation of the social heritage to man's development.

4. An understanding of the difficulties which have arisen because man's progress in the solution of his social problems has not kept pace with his progress in science and invention.

C. Attitudes and Appreciations.

1. An attitude of personal responsibility.

2. An attitude of sane optimism concerning one's own potentialities to cope successfully with personal and social problems.

3. An attitude of thoughtful respect for duly constituted authority.

4. A desire to be a good workman in one's chosen field.

5. An attitude of constructive participation and cooperation in the activities of democratic
society.

6. A desire to rely upon orderly methods of effecting social changes.

7. The attitude of withholding judgment until all available evidence is in and of viewing all situations open mindedly.

8. The attitude of developing working hypotheses upon the basis of existing evidence.

9. The willingness to test one's hypotheses against new evidence and to discard such hypotheses when new evidence is discovered which disproves them.

10. An appreciation of the contribution of mathematics to the fine and practical arts.

I. Objectives.

A. To learn that all measurements are approximate.

B. To learn the general meaning of "unit of measure."

C. To appreciate the advantages of certain standard units over arbitrary units.

D. To appreciate the necessity for accuracy in use of the fundamental operations in relation to measurements.

E. To be discriminating concerning tools and methods used in measuring.

I. Objectives.

A. To learn the proper use of compass, protractor, straight edge, etc.

B. To appreciate the use of geometric figures in architectural and structural design.

C. To learn to evaluate the reasonableness of results.

D. To develop the scientific attitude of inquiry.

E. To develop the necessary vocabulary for the precise statement of geometric functions.

F. To be sensitive to artistic geometric combinations when these appear.

I. Objectives.

A. To develop an appreciation of the amount of quantitative thinking necessary for the efficient management of the home.

B. To develop an appreciation of the proper
use of the income.
 "C. To develop an appreciation of the value of thrift in relation to the activities of the home and the community.
 "D. To develop an appreciation of the value of systematic saving and wise investment.
 "E. To develop a working vocabulary of terms common to everyday business transactions.
 "F. To perform the processes common to normal consumer activities.
 "G. To understand and appreciate the necessity for, the services provided by, and procedures involved in taxation.
 "H. To develop the ability to use money wisely.

"General Objectives.

"1. The ability to understand and use the language of algebra.
 "2. The ability to analyze problems and to formulate them mathematically.
 "3. The ability to understand relationships between variables, including methods of determining and expressing them.
 "4. An understanding of the relationship of algebra to other forms of mathematics.
 "5. Ability to apply to concrete problems the manipulative skills required in algebra.
 "6. Ability to understand and apply the functional meanings as well as the mechanics of algebra.

"Attitudes and appreciations.

"a. An appreciation of the historical background of geometry.
 "b. An appreciation of the contribution geometry has made to civilization.
 "c. A realization that a logical arrangement of facts in geometry is an experience in training for logical thinking in any situation.
 "d. An appreciation of geometry in nature.

"Objectives.

"In addition to the general objectives for secondary mathematics, the following apply specifically to the field of applied mathematics.

"1. To emphasize and put to work those skills in mathematics that are applicable to everyday living.
"2. To show a definite relationship between economic problems and mathematical interpretations.
"3. To show the interrelationships between science and mathematics.
"4. To help the students see the need for good work habits...." (40)

Butler, of Michigan College of Education, and Wren, of George Peabody College, have brought together the objectives of a number of writers in the field of mathematics.

"Classification of Objectives.

"Among the earlier authoritative works to give particular attention to this problem, the classic Report of the National Committee on Mathematical Requirements stands pre-eminent in the matter of clarifying these aims, just as it was for seventeen years the dominant influence in shaping the more forward-looking courses of study. Its classification of the broad aims of mathematical instruction as practical, disciplinary, and cultural has been mentioned in a previous chapter. This classification has been extremely useful as a guide to teachers, supervisory officers, curriculum makers, and textbook writers. Indeed it has exerted so much influence that it has come to represent a sort of standard frame of reference for objectives in this field.

"Young......discusses the principal values of the study of mathematics under three general headings: (1) practical values of mathematics; (2) mathematics as a mode of thought; and (3) other functions of mathematics. Under this third and rather indefinite heading he mentions values which are in the nature of attitudes, habits, and ideals.

"Breslich classifies the principal aims as (1) understandings, (2) skills, (3) problems and methods, (4) appreciations, (5) attitudes, and (6) habits.

"Blackhurst lists them as (1) attitudes, (2) concepts, and (3) information.

"Schorling presents the general objectives for junior high school mathematics under four headings: (1) attitudes, (2) concepts, (3) abili-
ties, and (4) information. In another and later book this same author gives the following more detailed list of general objectives for high school mathematics:

1. To increase skill in computation.
2. To enlarge understanding of the basic concepts and principles of mathematics.
3. To provide a wider range of applications of mathematics to other school subjects and to life needs.
4. To achieve more power in mathematical reasoning or problem solving.
5. To secure a thorough understanding of measurement.
6. To familiarize the pupil with the properties of the common geometric forms (intuitive geometry).
7. To know and to be able to use methods of expressing mathematical relationships.
8. To learn to use and appreciate symbolism.
9. To learn to see the interrelationships of the various branches of mathematics.
10. To understand how mathematics is related to practically all branches of learning.
11. To enjoy mathematics for its own sake.

Smith and Reeve, in discussing the objectives of junior high school mathematics, give the following double classification.

Great Central Mathematical Objectives.

1. An introduction to the general range of elementary mathematics.
2. Some appreciation of the power of mathematics.
3. The increase of certain powers (specified).
4. Fostering the study of mathematics.

General Objectives.

1. Establishing certain habits.
2. Exercise in fundamental modes of thought.

In a subsequent discussion these same authors consider in some detail a number of more specific objectives under the headings:

a. Appreciation of mathematics as a useful
art.
"b. Appreciation of mathematics as a science.
"c. Appreciation of the historic growth of mathematics.
"d. Attitudes of mind to be developed.
"e. Ideals to be cultivated." (13)

The National Commission on Cooperative Curriculum Planning has recently published a report on objectives:

"The Place of Mathematics in Secondary Education, is typical.

"a. To recognize and formulate the assumptions underlying an argument.
"b. To recognize terms that require precise definition.
"c. To organize statements in a coherent logical sequence.
"d. To recognize the proposition under discussion and realize when a conclusion has been reached.
"e. To discover common flaws not only in reasoning in mathematical and related fields, but also in areas inviting emotional bias....
"f. To recognize the logical structure or plan of an extended series of propositions...." (36)

The University High School in Chicago shows how mathematics contributes to the general objectives:


"General Mathematical Objectives.

"1. Familiarity with all four ways of expressing quantitative facts.....
"2. Ability to solve problems.
"3. Accuracy." (55)

Minnick, of the University of Pennsylvania, presents mathematical objectives from the teacher's viewpoint.

"In general, however, the teacher of mathematics should have the following purposes in mind: First, to give each pupil a mastery of those phases of mathematics which are necessary for living in his social and material environment.... Second, to give each individual those phases of mathematics which are necessary for his vocation.
"Third, to enable individuals to recognize mathematical situations so that they may refer them to specialists if they are unable to solve them.... "Fourth, to enable individuals to discover new and more efficient methods of procedure....." (33)

Conclusions:

The four objectives (skills, attitudes, appreciations, knowledge and ability to use it) which were prominent in the Industrial Arts list also stand out in the mathematics list. The emphasis, however, is beginning to shift in the following ways:

(a) Skill, while still predominant, is beginning to give way to the other three objectives.

(b) Mental skills receive more emphasis than manipulative skills.

(3) English and Literature.

The fields of English and Literature will now be studied to see whether they too make use of the same objectives (skills, attitudes, appreciations, knowledge and ability to use it). Some modern trends in English are discussed by Cross and Carney of the Colorado State College of Education.

"The Direction English Teaching is Taking.

"Among the leaders in education....there is the wish to make education practically useful...... "The modern trends in the whole field of English may be summed up in the light of these surveys. The general tendency in teaching composition seems to be toward reducing the time for formal composition and increasing the time for informal communication by both speech and writing, and for extensive reading of literature. This comes as a result of the effort to make all de-
portments of the school realize their responsibility toward preparing the pupils in language as a means of communication. While this is apparently the tendency, many educators feel that it may be necessary to increase the emphasis on composition for all practical purposes in the eleventh and twelfth grades. The survey shows, however, that too much time is given to the teaching of form, grammar drills, and punctuation, and not enough to thoughtful observation, and communication of ideas to others." (15)

A committee from the University High School in Chicago has developed a detailed list of objectives for English Composition.

"Objectives for teaching composition.

"1. Ability to use words effectively: pronunciation, enunciation, spelling, precision of meaning, grammatical accuracy, and appropriate usage.
"2. Ability to use sentences which are grammatically correct and rhetorically effective.
"3. Ability to construct unified, coherent paragraphs.
"4. Ability to select materials according to a plan and to develop for various purposes coherent discourse of some length, both oral or written.
"5. Ability to use marks of punctuation in accordance with accepted usage.
"6. Ability to prepare manuscripts in acceptable form.
"7. Ability to revise and proofread manuscripts.
"8. Understanding of the principles of grammar sufficient to make one critical of one's own language.
"9. Ability to participate effectively in informal conversation and group discussion.
"10. Ability to construct and to deliver effectively short talks.
"11. Ability to make various types of outlines and organizations.
"12. Ability to listen profitably to formal presentation of materials by the teacher and pupils.
"13. Ability to write letters of various kinds suitable in content and appropriate in form.
"14. Ability to take notes systematically and effectively for various purposes.
"15. Ability to prepare a bibliography, cite references and quote references."
"16. Ability to make summaries and abstracts.
"17. Ability to write reviews of books, plays,
photoplays, concerts.
"18. Ability to write short papers of comment.
"19. Ability to conduct and report an interview.
"20. Understanding and appreciation of the
structure of language as a social institution.
"21. Ability to use the dictionary.......
"22. Ability to use the library....
"23. An elementary understanding of parliament-
ary procedure.......

The Los Angeles City School System has recently pub-
lished a report which stresses the importance of English
skills.

"In the teaching of the English skills there are
many specific objectives in each of the several
aspects of that broad field. There are, however,
three primary objectives with which the teaching of
any and all of the language arts in junior high
school is concerned.

"1. The development of desirable attitudes.
"2. The habituation of correct English usage.
"3. A progressive improvement and maturation
in the tastes of junior high school pupils.

"This Course aims to afford learning experiences
through which pupils may grow, according to their
age and individual abilities.

"a. In effective spoken and written use of
the English language.
"b. In ability to read competently for both
study and recreation.
"c. In discriminating appreciation of books,
magazines, newspapers, cinema, and radio enter-
tainment.
"d. In appreciation of those classics of
literature which are a part of our American cultural
tradition.
"e. In understanding of American ideals and
basic principles of the democratic way of life as
reflected in the lives of great American personages...
"f. In understanding the major social and
civic trends and problems characteristic of our
complex and rapidly changing civilization.
"g. In cultivating the characteristics of
good citizenship through democratic classroom pro-
cedures and understandings.
In understanding the rich and varied community resources of their own vicinity.

The following objectives here set up are based both upon the suggestions from the literature and upon empiric data.

1. To develop with increasing maturity permanent, genuine, and wholesome interests in reading.
2. To develop ability to select desirable and varied materials and to read widely.
3. To acquire economical and effective study habits such as concentration, comprehension.
4. To develop ability to use effectively different types of reading materials and to interpret their meanings.
5. To improve in the mastery of the mechanics of reading, such as perceptual processes, pronunciation, vocalization, articulation, phrasing, et cetera; and to improve the habits of reading such as sitting and standing positions, light adjustment, placement of book and the like.
6. To increase the reading and speaking vocabulary.
7. To acquaint pupils with a reasonable number of pieces of good literature and their authors, through stressing functional rather than intrinsic artistic values or historical development.
8. To extend farther the experiences of pupils through wide reading.
10. To develop skill in interpreting maps, charts, tables.
11. To stimulate growth in appreciation and recognition of both excellencies and limitations in the quality of literary compositions.

At junior high school level many children need specific instruction in order that they may study more effectively. The following relatively simple techniques, skills, and abilities should be developed:

1. To comprehend and interpret the material read.
2. To visualize described details.
3. To select the central thought and supply
important details in sequence.

"4. To find topics and sub-topics.

"5. To summarize materials read, both orally and in writing.

"6. To skim for rapid reading and main ideas.

"7. To outline in preparation for study and subsequent presentation.

"8. To find answers to questions.

"9. To vary the rate according to the reader's purpose.

"10. To get a personal reaction to the content...

"11. To pass judgment.

"12. To draw conclusions and inferences.

"13. To make comparisons.

"14. To apply to one's problems the information gained." (32)

The objectives for oral and written English quoted below were taken from the English Course of Study for the State of Washington.

"Oral--General Aims.

"To develop the ability to present a subject within the range of his experience, in an interesting, forceful manner, with conscious correctness and form.

"Specific Aims.

"1. To secure clearness through the application of the principle of unity.

"2. To develop the power to organize material in a logical way.

"3. To develop the quality of interest in original work through principles of sentence variation, use of detail, and selection of words.

"4. To help student utilize such means of appeal as a pleasing voice, correct posture, clear enunciation, and accurate pronunciation.

"Written--General Aims.

"To secure freedom of expression in writing through habits of wise selection of materials and knowledge of correctness of form.

"Specific Aims.

"1. To transfer knowledge acquired in the study of oral composition to written form.
"2. To make use of essential punctuation marks.
"3. To establish conventional forms." (46)

Bond, University of Minnesota, has made a statistical study of the importance of the various objectives in reading.

"Reading Purposes Listed by Students in a College of Education Summer Class Session.

<table>
<thead>
<tr>
<th>Silent Reading</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>To increase general information</td>
<td>73 / 19</td>
</tr>
<tr>
<td>To gather information</td>
<td>63 / 17</td>
</tr>
<tr>
<td>To obtain and act upon directions</td>
<td>24 / 6</td>
</tr>
<tr>
<td>To verify facts and opinions</td>
<td>15 / 4</td>
</tr>
<tr>
<td>To form an opinion</td>
<td>11 / 3</td>
</tr>
<tr>
<td>To evaluate material</td>
<td>7 / 2</td>
</tr>
<tr>
<td>To form a basis of judgment</td>
<td>5 / 1</td>
</tr>
<tr>
<td>To understand a situation</td>
<td>3 / 1</td>
</tr>
<tr>
<td>To judge appropriateness</td>
<td>2 / 1</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
</tr>
<tr>
<td>For sheer enjoyment</td>
<td>113 / 30</td>
</tr>
<tr>
<td>To enlarge interests</td>
<td>24 / 6</td>
</tr>
<tr>
<td>To idle time away</td>
<td>14 / 4</td>
</tr>
<tr>
<td>To satisfy curiosity</td>
<td>1 / 0</td>
</tr>
<tr>
<td>Oral Reading</td>
<td></td>
</tr>
<tr>
<td>To provide recreation</td>
<td>6 / 2</td>
</tr>
<tr>
<td>To alter public opinion</td>
<td>3 / 1</td>
</tr>
<tr>
<td>To give factual data</td>
<td>2 / 1</td>
</tr>
<tr>
<td>To give directions</td>
<td>1 / 0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>To improve reading abilities</td>
<td>8 / 2</td>
</tr>
<tr>
<td>Unclassified</td>
<td>3 / 1</td>
</tr>
<tr>
<td>To develop ego</td>
<td>1 / 0</td>
</tr>
</tbody>
</table>

"The Nature of the Reading Program.

"Summary.

"The theory upon which this book is based is that reading is a continuous process. Reading is a very important and complex process. It is made up of numerous skills and techniques, of which the kind and quality vary with the purpose of the reader and with the type of reading situations.

"Silent and oral reading purposes and the various types of reading that might be useful in realizing the goals were listed. It was shown that there is always a reading purpose, irrespective of
the type of reading done or of who is doing it. The purpose may be an unconscious one or it may be consciously defined. Students should have instruction and experience in setting up reading purposes to enable them to set up their own purposes in out-of-school reading during their school and adult life.

"Reading instruction in both oral and silent reading should include the following areas:

"1. Development and refinement of reading techniques and skills.

"2. Development of vocabulary and background concepts.

"3. Development of reading interests and tastes.


"5. Development of a differentiated attack.

"Reading Skills and Techniques.

"Reading to get the general significance 101 21
"Oral reading 54 11
"Skimming 39 8
"Work type 37 8
"Sentence, paragraph, and story comprehension 27 6
"Noting details 29 6
"Organizing 24 5
"Scanning 16 3
"Locating information 15 3
"Reading critically 10 2
"Following directions 9 2
"Speed 9 2
"Word recognition techniques 8 2
"Reading to predict outcomes 4 1
"Reading graphs, maps, tables 1 0
"Unclassified 100 21"

(10)

Reading and Literature.

The junior high school objectives for reading and literature were published in the Junior High School English State Course of Study for Washington.

"General Aims.

"To lead to an eager and appreciative reading
of books of as high an order as is possible for the given individual.

"Specific Aims.

1. To develop the mechanics of reading to the maximum of individual ability.
2. To assist in developing habits of intelligent interpretation and application of material.
3. To give an acquaintance with, and an opportunity for enjoyment in, recognized masterpieces.
4. To instill and encourage development of ideals.
5. To develop the habit of evaluating literature in terms of trueness to life." (46)

The University High School in Chicago also has published a list of objectives for reading and literature:

"Purpose for Teaching Reading and Literature Objectives.

1. Extension of experience: geographically, historically, socially, intellectually, emotionally, and morally.
2. To broaden, deepen, and interpret one's own experiences; to see one's own life and surroundings more clearly.
3. Understanding and appreciation of the fundamental social institutions.
5. Development of right attitudes through reading....
6. Vicarious participation in the common or universal experiences of the race through the reading of a reasonable portion of our literary heritage.
7. Understanding of and sensitivity to literary and artistic qualities in writing.
8. Sensitivity to those qualities in poetry, orations, and drama appreciated best when addressed to the ear.
9. Some sense of the time, the place, and the contribution of the great literary figures.
10. Growth toward mature reading tastes and critical powers of evaluation.

The distinction between the aims of English and of Literature as expressed by Cross and Carney concludes the
discussion of objectives in these fields:

"The study of Literature, the other half of the English teacher's responsibility, always deals with an art instead of a skill." (15)

Conclusions:

The same four general objectives (skills, attitudes, appreciations, knowledge and ability to use it) are also prominent in the English and Literature lists quoted above. Note, however, the following trends:

(a) Skills are strongly emphasized in English but these skills are more of the mental type than manipulative.

(b) Skills are distinctly a minor issue in the study of literature. Attitudes and appreciations come first.

(c) The objectives in general are so broad and include so many shades of meaning that it is more difficult to summarize the list under four headings (skills, attitudes, appreciations, knowledge and ability to use it) than it was with Industrial Arts and Mathematics.

(4) Modern Foreign Languages.

Subject matter fields somewhat closely allied to English are the Modern Foreign Languages. How do their objectives compare with those above and what are the trends?

A Pennsylvania Department of Public Instruction Bulletin showed the development of foreign language objectives beginning with those prepared by the committee of twelve (1898) up to the present time.

"Although the foreign languages have been a part of the secondary curriculum for a longer
time than many other subjects, they can no longer be defended alone on the basis of their vocational value, their disciplinary value, or as a prerequisite for admission to institutions of higher learning." (3)

The committee of twelve stressed reading ability and put speaking in the background. Writing was also secondary. Translation and formal grammar were the immediate goals which would lead to the ultimate goal of reading. Finally the student should seek enjoyment in literature.

"Committee on Modern Language--1914.

"1. Good pronunciation.
"2. Precision in the use of words.
"3. Clear understanding of grammatical relations and of the terminology used to express them.
"4. Stimulation of interest in the foreign language.
"5. Ability to read an ordinary book rapidly, intelligently, and without too frequent recourse to a dictionary.

"It was the judgment of the committee that an attainment short of this is practically useless....

"Educational Objectives in Language by Bobbitt and Snedden, 1924.

"1. The ability to use the oral forms of one or more foreign languages in a simple way with moderate fluency or correctness.
"2. The ability to read a language with moderate ease and fluency and with enjoyment.
"3. An improved understanding of and a sympathetic attitude toward a people whose language is being studied.
"4. An increased degree of appreciation of a cosmopolitan spirit and attitude.
"5. An improvement in the ability to use one's mother tongue through an extensive and diversified language experience.

"The American and Canadian Committees on Modern Foreign Language--1927.
 Goals for Modern Foreign Languages.

1. Modern foreign language study should give the pupil such acquaintance with the speech, life, customs, and culture of a people as will enable him to read in that language for the purpose of enjoyment and information.

2. Modern foreign language study should make a contribution to a pupil's appreciation of the country. It should open a vision to the growth and significance of a culture and civilization as well as its contribution to present day life and activities.

3. Modern foreign language study should develop in the pupil an increased capacity for desirable and worthy experiences in everyday life, and he should acquire a greater depth of interest in world events, literature, art, and music.

4. Modern foreign language study should contribute to the development of a wider and finer appreciation of good literature through the comparison of the best literature in a language with that of English.

5. The study of a foreign language should develop a knowledge of the principles and forms of grammar which are known to be essential to reading, and it should encourage increased ability in the reading of the better books and literature which are within the interests and intellectual capacities of the pupil.

6. The study of a foreign language should equip a pupil with a recognized vocabulary of select words and expressions and develop within him an appreciation of language and a pride in its usage.
grammar which are essential to reading with comprehension.

3. Practice in writing easy statements.

4. Much practice in reading graduated materials which employ an increasing vocabulary. (3)

The National Commission on Cooperative Curriculum Planning stressed the progressive development of objectives as shown below:

"Algernon Coleman whose discussion of objectives in The Teaching of Modern Foreign Languages in the United States has furnished a pattern for the formulation of aims:

1. The progressive development of the ability to pronounce correctly, to understand, and to use the language within the limits of class materials; this involves the mastery of a basic vocabulary.

2. The progressive development of the ability to read in the foreign language cultural and literary material so selected, graded, and taught as to be within the scope of the student's interest and intellectual powers and to make language study vital to him as a means of acquiring information, new intellectual and esthetic experiences, a better knowledge of the mentality and mores of other nations.

3. The progressive development of the mastery of the grammar of the foreign language as a means of building up increasing rapidity and accuracy of comprehension.

4. The progressive development of a conception of the English language as a composite affair, with many words derived from other languages; of a fuller understanding of the derivation and meaning of at least some of these words; of a better knowledge of the principles and forms of English grammar and English speech gained by the comparison of forms and constructions in the two languages....

5. A fuller knowledge of the foreign country, past and present, and a special interest in the life and characteristics of its people." (36)

O. F. Bond, University of Chicago, expressed a distinctly utilitarian view when he prepared his list of foreign language objectives:

"Our curriculum makers are frankly puzzled about what to do with the language program, and their puzzlement has spread to the language teacher and
has filled him with unrest and uncertainty. He and his subject have become unpredictable in the educational market.

"All around the world, the study of foreign languages is pressing upward in a ferment of reality. People are learning to communicate with other people. A second language has become something real, something useful, something to be desired. It is being studied, not for itself, not for college entrance, not by order of higher authority, but in order that one man may communicate with another.

"Foreign language has joined the Applied Arts. It has become utilitarian. This is the first basic change in the Foreign language program of tomorrow.

"In our Capital, House Bill 2034 asks for an appropriation of two million dollars to provide annual stipends of $1000 each for a thousand student teachers to be exchanged two ways between the United States and the Latin-American countries. Last year, a host of Latin-American students were brought to this country under the auspices of a private agency, the Institute of International Education. There are far-reaching programs in 'intensive' language conducted by the Washington Inter-American Training Center, the American Council of Learned Societies, the Armed Forces Institute, and the Army and Navy Spanish project. The ASTP alone proposes the area and language training of thousands of soldiers who are to assist in the policing and government of occupied Europe. Already, the programs are under way. Corps of language specialists are preparing texts, recordings, and tests for the instruction of future members of our occupational forces, and other groups are working on materials for the teaching of English to Spanish and Portuguese-speaking populations.

"It seems improbable that those men who had been exposed to a language program in high school or college before their war experiences, will be satisfied with our language status quo. They will have realized, like the men of 1918, that language competency was all too rarely gained, and they will look for a change. Those whose foreign-language contacts were the direct product of the war will certainly not be satisfied with a long and tedious apprenticeship to formal grammar, with a daily routine of unreal transliteration of unrelated sentences, with pointless classroom chatter about absurdly childish things, or with the snail-like pace of the average language course. Most certainly they will not commend a course in which one reads
little, hears less, and speaks none of the language under study.
"They will want the assurance of language competency......
"The suggestion may seem trivial, but in the experience of the speaker, there are few schools whose foreign language department has a planned course of study, equipped with working details and specifications and data on its production line.
"Soldiers and civilians alike have learned the necessity of having well-defined objectives and well-drawn plans. It is quite likely that they will expect to find both objectives and plans in the post-war educational system." (11)

Conclusions:

Prominent in foreign language study are the same four objectives (skills, attitudes, appreciations, knowledge and ability to use it). The relative stress on each is shifted somewhat in order to fit the particular needs of the subject:

(a) Manipulative skill plays a much higher role than in the teaching of English.

(b) The past fifty years have seen a change of emphasis from reading skills to speaking skills.

(c) Appreciation was almost absent at first but is now coming to be one of the leading objectives.

(d) The "area" studies plan is leading towards a fusion of the objectives and subject matter of foreign languages with those of social studies, science, economics, literature, and geography.
(5) Science.

The next subject matter field to be examined is science. The first discussion of objectives in this field will be quoted from "Psychology in Education" by Starch, Stanton, and Koerth. They have compiled a series of objectives which have been published by a number of writers in the field of science.

"Objectives in Science Studies.

"The objectives in science studies center about their mental and social values to the individual. Former emphasis upon subject-matter and the memorization of facts, principles, and laws is transferred to emphasis upon the child's growth, his change in behavior, his ability to think with facts and to apply scientific principles to new experiences in order to assure a more satisfactory orientation to life. Development of the scientific attitude in thinking is perhaps the greatest objective to be attained in science studies.

"Typical Objectives

"Objectives in science studies are expressed through work to be done and changes to be made in the behavior and attitudes of boys and girls, as the following samplings of objectives will illustrate.

"Science objectives in the elementary school are given by Craig, Russell, and Boyles. Craig (1937) believes that the content of the modern elementary curriculum should be selected and evaluated on the basis of its social worth to the child and society, that a speaking acquaintance with science should be given to the masses of democracy since science is a subject whose latent power can be used to benefit or to destroy civilization. Russell (1937) emphasizes the value of science in the development of control over certain character traits, such as self-confidence, aggression, passiveness, dependability, cooperation, in providing unlimited opportunities to use one's intelligence, and as a release to the very
"Sensitive child.

"In helping elementary pupils to discover and isolate the conflicting phases in their outlook on life, Boyles (1936) would teach nature study and science according to the following technique, which is necessarily condensed for inclusion here.

"(1) Handle the classroom at all times in such a manner as to enhance the reflective abilities of the pupils, and by this means teach them as many facts and principles of science as one can chuck into their respective minds in the allotted time.

"(2) For introducing subject matter, select incidents which one has found to be fruitful in precipitating challenging and arresting problems—problems which give promise of solution or resolution at the level of maturity which the class represents.

"(3) In order to solve the problems seeks always to guide the thinking of the class toward the formulation or discovery of principles or interpretations which will bring the factors of conflict into harmony one with another. This is the teacher's basis for criticism.

"(4) Before leaving the problem, be sure to provide leads into other problems which in turn are progressively more complicated and must be reserved for later treatments. Above all, do not let the child leave with the feeling that he has settled the affairs of the world. Such an attitude is fatal to further growth. It is not the attitude of a scientifically minded man.

"Science objectives in the high schools are expressed by Conklin, Hunter and Knapp, Hodge, and Gilbert. Conklin (1937) holds that the chief aim of science teaching is to develop sound mental and social habits, not only knowledge but character; that all 'good teaching begins with inspiration or stimulus, proceeds to illumination or example, and that mere information is the least important of the three: information, illumination, inspiration and the greatest of these is inspiration.' He lists other aims of science teaching which are to:

".....develop habits of curiosity, accuracy, logical and rational deductions, distinction of fact from fancy, reliance on natural causation rather than magic, appreciation of the fact that all knowledge is the result of experience and that it is never perfect but always capable of improve-
ment, humility in realizing
'How little we have gained,
How vast the unattained,'
aesthetic appreciation of the stability, order and beauty of nature, ethical devotion to truth, sympathy and service....How sadly the world needs such habits is evident on every side.

"Hunter and Knapp (1932) analyzed the ideals, goals, aims, or objectives for which teachers strive in the junior and senior high schools. Replies to their inquiries were received from 393 schools from every state in the union except West Virginia. The differences in emphasis by teachers at each level are illustrated in Figure 27. These science objectives were then compared with those of experts in the field of science teaching who were members of the National Association of Research for Science Teaching. They found at the junior high school level that the N.A.R. members emphasized the exploration of child's interests and the appreciation of the environment while teachers emphasized knowledge of the environment; that they placed more emphasis than the teachers on scientific method, scientific thinking habits, and scientific attitudes. At the senior high school level the N.A.R. members stressed the mastery of the scientific method and development of the scientific attitude toward problems while the teachers emphasized the propaedeutic and informational objectives. The investigators feel that the science work on both levels does not show much evidence of humanizing science through the development of appreciation of the work of scientists." (49)

Wolford made a study of the methods for determining types of content to be included in a course of study for eighth grade science in the high schools of the Southern Appalachian Region. He found no general agreement on objectives as shown below:

"There is no general agreement as to the character of objectives for science in the junior high school, but most authorities emphasize the ideas of exploration, stimulation, guidance, and adjustment to the environment. There appears to be no conclusive method of evaluating objectives.

"....there is very little agreement among
PLATE 31

THE RELATIVE EMPHASIS UPON SCIENCE OBJECTIVES
Fig. 27.—The relative emphasis on science objectives for junior high school (solid bars) and for senior high school (single hatched bars). 538 responses at junior high-school level and 305 at senior high-school level. [From G. W. Hunter and R. Knapp, 1932, p. 411.]
writers as to what should be included (in a textbook of general science), and...no attempt has been made to prepare a textbook that is specially adapted to a particular region.

"If the materials in newspapers and magazines denote the interest of their readers, people are mostly interested in their immediate rather than in their remote surroundings." (16)

Davis, of the University High School in Madison, Wisconsin, made a study of scientific attitudes. In this study he set forth a list of specific objectives:

"The specific objectives of science teaching are:

"Command of factual information.
"Familiarity with laws, principles, and theories.
"Ability to distinguish between fact and theory.
"Concept of cause and effect relationship.
"Ability to make observations.
"Habit of basing judgment on fact.
"Ability to formulate workable hypotheses.
"Willingness to change opinion on the basis of new evidence.
"Freedom from superstitions.
"Appreciation of the contributions of science to our civilization.
"Appreciation of natural beauty.
"Appreciation of man's place in the universe.
"Appreciation of the possible future developments of science.
"Possession of interest in science." (16)

Walter Keighton listed three liberal arts objectives in the Journal of Chemical Education.

"Chemistry in Liberal Arts College
"3 objectives:  1. Training to live well
         2. Take intelligent part in society
         3. Earn a living." (31)

Hunter's study, "Six-Hundred Teachers Look at Science Trends," reported this item:

"On the whole especially in Junior High School
the trend is to more descriptive and less technical and not as much emphasis upon progressive problem solving." (30)

Powers of Columbia University, in his article, "Goal of Education in Science," briefly condensed the objectives into two groups:

"Two goals
1. College preparatory
2. Personality and social development
College preparatory courses seldom do the second well.
One purpose of science teaching is to help students realize that science is as much a part of their personal lives as it is a part of the physical world." (39)

A symposium, published in Science Education, contained a list of postwar objectives:

"Postwar objectives of science
2. Work experience.
3. Understand production, distribution, and consumption.
5. Knowledge of the great changes that are taking place in world today.
6. Ability to select and use materials available.
7. Preparation for life." (50)

An environmental approach to science objectives was given by Heiss in his, "Investigation of Content and Mastery of High School General Science Courses."

"...the units of subject matter should be organized from the point of view of our environment without any regard to the major divisions of science." (16)

The study, "High School Biology Content as Judged by Thirty College Biologists," which was made by Caldwell and
Weller of Columbia University showed that the geographic phase of science is an important objective.

"'Geographic Distribution of Plants and Animals,' a topic which is not now well represented in the course, is recommended by more than four-fifths of the judges." (16)

Margery Gillson stressed the importance of fundamental principles in her report on, "Developing a High School Chemistry Course Adapted to the Differentiated Needs of Boys and Girls."

"The fundamental principles of chemistry received greater stress than factual information." (16)

The same stress on principles of science is given by Johnson in his, "Critique for the Evaluation and Development of Science Courses of Study for the Pre-College Years."

"A Concept Period characterized by an organization based on principles of science is beginning." (16)

Several studies prove the soundness of the trend from detail and specifics to broad generalizations and application of fundamentals. For example: Tyler of the University of Chicago, in his, "Investigation of Retention," made the following statement.

"...specific information, which is represented by exercises requiring the naming of animal structures, is most quickly forgotten; that information of more general application is more permanent; and that during the 15-month period there was no loss in the ability of students to apply important zoological principles to new situations, or to interpret data obtained from experiments." (16)
Trutchey's study of, "Retention in High School Chemistry," showed that the retention of general principles was quite similar for both boys and girls.

"It is interesting to note that this latter objective is the application of facts and principles, a more general type of behavior. It was in this objective, too, that the largest percentage was retained....retention was greatest in the more general types of behavior. Although there were sex differences in the retention of achievement in some objectives, in the application of facts and principles, a more general type of behavior, there were practically no sex differences in retention." (16)

The soundness of teaching generalizations in the elementary schools is shown by Croxton's study, "Pupil's Ability to Generalize."

"In general it was found that the ability to generalize, to apply generalizations, and to do both increased with the grade.

"These data indicate that many children in the higher primary, the intermediate, and the junior high school grades are capable of generalizing." (16)

Conclusions:

When the same four objectives which were used with the other subject fields are compared to the objectives of science the following points can be observed.

(a) Skill is not nearly as prominent as it was in Industrial Arts or Mathematics.

(b) Knowledge and ability to use it leads all others for the first time.

(c) The stress on the understanding and application
of fundamental processes draws more heavily upon knowledge and ability to use it than it does on the other three objectives.

(d) The scientific attitude is one of the basic objectives of all sciences.

(e) The survey courses are based more upon the appreciation objective.

(f) The college preparatory courses place more stress upon the knowledge concept while the non-college or general education sciences place more stress upon attitudes and appreciations.

(6) Social Studies.

The last subject matter field to be quoted in detail regarding objectives is social studies. The postwar implications of social studies' objectives were discussed by Reavis in his book, "War and Postwar Responsibilities of American Schools."

"In the postwar world the most important single social obligation of American education, and especially of the secondary schools and colleges, will be the development in youth of a critical understanding of the social order, of our social design, of the workings of our economic, social, and political arrangements.

"It will be my contention that the fruits of education in this country have been and are largely private and personal rather than public and social, that the scientific study of education has been oriented too much around the concept of education as a psychological process and too little around the concept of education as public and social policy, that we professional educators have been and are highly insensitive
to the changes that a technological revolution has wrought in the very structure of our social design, and that in fact we have not done a very good job of cultivating in youth the knowledge, insights, and motivations they will need to resolve important issues they cannot avoid.

"What will be the effect on American education, one may ask, of this increased emphasis on social technology, of this attempt to reconstruct institutions according to plan? It would seem that the center of interest in education will have to shift to a considerable degree from the individual to the society. In working out the new orientations, it appears that the program will have to be so shaped as to meet at least three major requirements of social reality.

"The first of these requirements is the socialization of youth in terms of the basic assumptions of democracy. The second requirement of social reality is that the oncoming generation become skilled in the processes of democratic action.

"And now we come to the third requirement of social reality and it seems to me at this point we are approaching the nub of the matter. Stated simply this requirement is that youth be equipped with the will and the breadth and precision of knowledge required of them to play their part in shaping broad public and social policy." (42)

The general education point of view of the National Commission on Cooperative Curriculum Planning is:

"Here are the great categorical imperatives of the social studies in American democracy; the school which is not performing these functions is delinquent.

"1. The development of informed, courageous, free citizens.

"2. The encouragement of full participation in the various manifestations of democracy, whether in the home, in clubs, in the school, or in the community in which one lives.

"3. The development of the ability to attack social, economic, and political problems as they arise today. Such ability entails the mastery of the following skills:

"a. Ability to think intelligently, critically, and with careful attention to relevant data."
"b. Acquisition of information which will form a constant reservoir of data relevant to problems as they arise.

c. Ability to apply the historical method to current problems.

d. Accomplishment in certain peculiar skills relating to the social sciences, such as the ability to read maps, follow political arguments, comprehend geographic factors, construct and interpret index numbers.

e. The growth within every student of a personal dedication to such essential goals of American democracy as freedom, tolerance, responsibility, justice, group decision.

The social studies in America also have other more general purposes. The following would be desirable objectives of social education whether our nation were a democracy or not.

f. The ability to understand and appreciate the past and present history of one's own country, and of the world in general.

6. The ability to understand at least the broad general principles underlying modern political, social, and economic problems.

7. The development of a constantly growing personal culture." (36)

Psychology in Education by Starch, Stanton, and Koerth has the following contribution.

"Objectives of Social-Science Education"

"The ultimate objectives of social subjects are in general the same as of other subjects. More specifically, however, the aims of social-science education are designed to make the pupil a more competent citizen of his own country and of the world by making certain adaptations and acquiring certain understandings, and if possible wisdom, which prepare him to meet adequately the demands of social, industrial, and political life. The aims are not only to socialize the pupil and make him conform to conventional patterns but to aid him in acquiring such habits, knowledge, and insights into the structure of society as will be useful in solving the problems he meets in the exigencies of living.

"Immediate aims of teaching or learning history, civics, geography, or what not, may make those seem
to be remote objectives. But unless those objectives vitalize teaching and learning, the process may be barren indeed of educative values. Immediate objectives are important, however, in shaping the day-by-day study and practice to achieve the knowledge and skills believed essential to social competence. Here as elsewhere, well-defined, immediate aims are more effective motivating factors than remote indefinite goals.

"Whether the goals are immediate or remote, specific or general, the social subjects separately and together are expected to provide those educational activities wherein the pupil finally (1) becomes acquainted with the lives of people and therefore more sympathetic toward them and less selfishly egocentric in his outlook; (2) learns the accepted standards of behavior and controls his own activities accordingly; (3) learns to understand the complex interrelationships of economic activity; (4) learns to know the structure and problems of government and to function as an intelligent voter and citizen; (5) gains an adequate background of historical knowledge with which to form wise judgments about contemporary events; (6) acquires knowledge of and respect for the rights, privileges, and responsibilities inherent in group living; and (7) develops the useful social skills and right habits of control essential to the dependable and creative citizen."

Dr. F. A. Magruder, author of several leading textbooks in political science, was asked for his opinion as to what should be the objectives of the social studies. His views rather closely paralleled those already stated except that he was emphatic in his belief that the postwar period would see a marked trend toward the practical in the social studies. The textbooks would have more applications in them than they ever have had before.

Conclusion:

The four objectives (skills, attitudes, appreciations,
knowledge and ability to use it) appear frequently in the above lists. Emphasis is placed heavily upon attitudes and appreciations. Skills also appear often, but these skills are gained through having the students actively live in a social order rather than by teaching them how to live in society after they grow up.

(7) Other Subjects.

Space will not permit the quoting of objectives from all the subject fields in the public schools, but the writer has made a study of the following groups: Spelling, Writing, Home Economics, Business Administration, and Speech. The following is a summary of the results of this study.

(a) A predominating part is taken in all of these subjects by the same four objectives: Skills, Attitudes, Appreciations, Knowledge and Ability to use it.

(b) Skills lead the list in Spelling, Speech, and Writing. They are important in Business Administration but play a less important role in Home Economics.

(c) Knowledge and ability to use it is strong in Business Administration and Speech although it is an important item in all.

(d) Attitudes and appreciations probably play their biggest role in Home Economics.
4. Conclusions Regarding the Objectives of the Army Air Forces Schools Compared to Those of Certain Subject Matter Fields in the Public Schools.

a. The same four objectives play a prominent part in both the Air Force schools and the public schools.

b. There were important elements of education and training in all subjects studied.

The distinction between civilian versus army training is further explained by Dr. Brainard, President of St. Cloud State Teachers College, Minnesota.

"Different Objectives.

"Another difference between the military educational program and civilian education is to be found in the objectives. The military programs have been spoken of by some as training programs rather than educational programs. Such phraseology is intended to convey the idea that the army took men already educated in whole or in part, in civilian high schools or universities, and trained them intensively in specific techniques in order to prepare them for special duties. Thus the army took men who were college graduates and trained them specifically in the duties of army officers. If these men had not possessed a broad educational background to begin with, the intensive military program could not have been successful." (12)

c. Industrial Arts was the only subject which closely approached the Army Air Forces schools in the emphasis upon skills.

d. Manipulative skills received the greater emphasis in the Air Forces schools while mental skills
were more often favored in the public schools.

e. The objectives of the Social Studies were often used by the Air Forces schools for the purpose of controlling morale.

f. The Air Forces took a very narrow and limited view of the educative processes while public education takes the broadest view possible. For example, Lt. Greer said:

"The objective of the pilot training program is relatively narrow. ... The objective of civilian education is the broadest possible development of the individual as a useful member of society." (26)

g. The Air Forces subjects are short and specific. Lt. Greer said:

"All courses (physics, mathematics, radio, etc.) are relatively short and cover only aspects relating to military aviation." (26)

He further suggested that the public schools can learn an important lesson from the Air Forces experience:

"The Air Forces school has found that it is futile to teach masses of detailed information.... The Air Forces experience suggests that in the public schools the curriculum always should be concerned with the large, basic simple facts and operations." (26)

h. The Air Forces stressed the need for keeping the objectives and goals constantly in the minds of the trainees. Lt. Greer said:

"The reason for learning a certain subject should be incorporated in every day's lesson." (26)

The following statement was made over a national
broadcast in which General Weible, Director of all Army Training Schools, and Admiral Jacobs were interviewed:

"The close linking of theoretical and practical training which characterizes GI education should help us in the schools .... to realize the importance of revamping school programs so that our training may be more realistic. This means in effect the setting up of many short-term, reachable, definite goals." (8)

Dr. S. F. Bayne, Assistant Superintendent of the New York City Schools said on the same broadcast that there were four goals which have lead GI educators to such an outstanding success: These goals were:

"(1) Guidance.
"(2) Studying the purpose of each course of training.
"(3) Setting forth the minimum goals of each course.
"(4) Insisting upon definite mastery of these goals." (8)

i. Repetitive drills in attaining the objectives have not played as important a part in the public schools as they have in the Air Forces schools.

j. The Armed Forces used small classes as a means of attaining their objectives. For example, J. W. Nason, President of Swarthmore College, said, "Both the Army and Navy have opposed large classes." (34) J. G. Eldridge, of the University of Idaho, in speaking of language study said:

"Five hours of instruction a week in language structure, followed by two hours of conversation practice six days a week, in groups of not over ten men each ........." (21)
k. A study of the objectives in Foreign Language study shows that during the past fifty years there has been a gradual transition in the public schools from ability to read a foreign language to more emphasis upon a sympathetic understanding of the nation whose language is being studied. The ASTP has carried this view still further by making foreign language a part of an Area. They called for a fusion in this area of a study of the whole nation. That is, they included such topics as geography, customs, culture, economics, politics, and literature in the language area study. They have also brought about another drastic change in that they have made skill in speaking the language the paramount objective while skill in reading along with a study of grammar have decreased almost to the vanishing point.

1. A study of objectives should not be completed without emphasizing again that the Armed Forces have not developed a new set of objectives. They have simply taken the same objectives of the public schools (skills, attitudes, appreciations, knowledge and ability to use it) and made outstanding use of them. In other words, GI education is not something radically new. For example, General Weible, in speaking of Army schools, said:

"We have discovered no new philosophy. We have made no new discoveries. We have invented nothing new." (8)
The same viewpoint was expressed by Admiral Jacobs:

"I'm afraid we in the Navy can't claim any world-shaking discoveries in education." (8)

Lt. Greer, formerly of San Diego State College, carried the point still further when he said:

"Teaching methods which proved successful in public education have been adopted as standard practices in Army training. Hundreds of civilian instructors have been taken into the service and assigned to teaching duties. Direction and extension of the academic program has been entrusted largely to professional educators."

Lt. Greer concluded his article with a thought provoking statement for all educators in the public schools:

"We have stopped at nothing in order to give them the best training in the world. Why should we do less in educating youth for democracy?" (26)

5. How Will an Oregon Training Aids Unit Meet the Needs of the Elementary and Secondary Schools of the State?

a. The preceding section of this paper has shown that the Air Forces schools and the public schools both utilized several of the same objectives. The essential difference lay in the varying emphasis given to each of these objectives. Thus it seems logical to conclude that an Oregon Training Aids Unit could meet the same four objectives (skills, attitudes, appreciations, knowledge and ability to use it) as well as the Air Forces did.
The next question, then, is whether the Air Forces believed their Training Aids Units had done a successful job. The Army did not have time for elaborate educational research when it was trying to win a war, but many articles can be quoted to show that the opinion as a whole was favorable to the use of materials produced by the Training Aids Units. The following pages contain some typical quotations. An editorial in the American School Board Journal said:

"The entire undertaking could not have succeeded without the use of special methods and such aids as newly prepared sound films, graphic charts, and other objective aids. Vague theory has been noticeably absent from the work, and insistence has been placed on facts, use values, and immediate application to the day's work." (19)

Major Witty, formerly of Northwestern University, said:

"Where objectives are clearly defined, subject matter thoroughly organized, and methods of instruction well adapted to the needs of the group, visual aids serve to facilitate learning. They enable the teacher to motivate his class work and vitalize his instruction; and they serve to clarify presentations and hence to improve communication.... An indispensible adjunct to effective methodology is the Visual Training Aid. It has already demonstrated its value in a training program which must secure the maximum results within a minimum time limit." (57)

Major Witty had this to say about the establishment of Training Aids Units:

"No single type of visual aid is recommended for a particular period of instruction in a Special Training Unit. Instructors can select the types of Aids with which they are most familiar
and which seems most suitable for a particular purpose. To help instructors, most Special Training Units have organized a Training Aids Section which prepares and distributes training aids." (57)

J. W. Nason said in the Journal of Higher Education that:

"Visual education like intensive language instruction is not an Army or Navy invention, but under the exigencies of war it has been more widely used and publicized than ever before.......Here shortness of time, together with the ability of many enlisted men to learn more easily through pictures than through words, has dictated the extensive use of moving pictures. Its efficiency as a device of instruction in this connection has been fairly well demonstrated." (34)

Admiral Jacobs, Chief of Bureau of Personnel, said:

".....And because we believe that this business of motivation is the strongest force in education, we go to any lengths to increase and hold it.....The training aids we've heard so much about are just a means of making things real." (6)

General Weible said:

"But also, they (visual aids) speed up learning and we've had to speed up learning in the services." (6)

Some peacetime research studies also support the belief that different aids can meet the needs of the four objectives listed above and that a given aid can be so designed that it can meet the needs of several objectives—but not necessarily meet all these objectives at the same time.

Major Hoban, formerly with the American Council on
Education, had the following comments on this problem:

"Many types of learning may be expected to result from the use of visual aids. There may be the mere feeling of familiarity with a certain object, process, or situation. There may be identification of that object, process, or situation, in relation to other objects, processes or situations. There may be generalization on the verbal level in relation to these experiences. There may be application or ability to perform some new or more complex act. There may be a better concept of relationships, a greater clarity of concepts, new insights, new appreciations and so on. Any or all of these may develop as a result of the use of visual aids in instruction. If, on the other hand, the outcome of the unit is to be richer experience, more vivid imagery, or more detailed concrete knowledge, visual aids become increasingly important. Still again, if the outcome of instruction is ability to form meaningful generalizations, a combination of visual aids, verbal instruction and teaching of generalization should be used. The mere use of visual aids without verbal instruction and without tuition in generalization is no guarantee that meaningful generalization will result from instruction. The question is not this visual aid or none, or this visual aid or that visual aid. The real question which confronts the teacher is: How can I bring about the desired change in the child? Visual aids, like verbal instruction, are means toward the larger end. The type of visual aid—the school journey, the object or model, the stereograph, the film, the slide, the flat picture, the map, the chart, or the like—will be determined by (1) the previous experience of the pupil, (2) the type of learning outcome, and (3) the type of material being studied.

"If the purpose of instruction is to reconstruct the past, to show the interaction of persons, processes, or events, and to do these things in detail, the film is an excellent medium of instruction. The value of any particular film or films is determined by the amount of previous experience of the pupil with this type of activity. If, on the other hand, a knowledge of objects, particular settings, or particular things, is the desired outcome of instruction, the presentation of the object itself, or of various types of repro-
ductions of the object will be equally effective if not superior to the film. The advantage of flexibility of instruction in a method which can be adapted in time and amount of instruction in relation to the particular outcomes of instruction." (17)

The Pennsylvania Department of Public Instruction in its handbook "Techniques of Visual-sensory Aids" has a splendid summary of the various ways visual aids can contribute to learning:

"Visual Aids assist the pupil in many ways. They give concreteness to ideas, connect words with objects, visualize factual conditions, economize time in understanding facts, interest pupils with object materials, furnish an approach to problems, create ideals, stimulate imagination. ........Investigations of recent years show that instruction can be and has been improved through the effective use of visual-sensory aids. Results of these investigations, among other things, show that the proper use of visual materials:

"1. Increases initial learning.
"2. Effects an economy of time in learning.
"3. Increases permanence of learning.
"4. Aids in teaching backward children.
"5. Motivates learning by increasing
   a. Interest
   b. Attention
   c. Self-activity
   d. Voluntary reading
   e. Classroom participation." (2)

b. The next point for a Training Aids Unit to observe is that a specific objective will determine the form of the aid to be used but not necessarily the type. In other words, if a given aid can meet the needs of the common objectives, the problem for the consultant is to make certain that he designs the aid so that it will meet
the need of the specific objective which is being taught. An illustration in the January 1944 issue of the California Journal of Secondary Education shows how an aid may be modified for a particular purpose such as the teaching of attitudes. The name of the article referred to is, "What Army and Navy Are Teaching Us About Visual Aids." (51) The author of this article shows that an objective such as attitude is taught not by changing the content or subject of the visual aid but by personalizing the material. The best way to personalize is to make the reader feel that he is actually a part of the story. This bringing of a reader into the story can be brought about best by making the story refer continually to real people. The author illustrates this point by showing how Swedish children were acquainted with and made to love their native land. The Swedish schools found that well written descriptions of the beauties and wonders of Sweden did not impress the children but that these same descriptions seemed alive when they were associated with stories of the travels of a boy named "Nil."

Now, take an illustration from the Armed Forces. The Navy wished to develop in its pilots an attitude of constant care and thoughtfulness. The material was personalized by the creation of a character, called "Dilbert," who was always in trouble as the result of not
being careful (See Plate 32).

c. It is now time to show how the study of objectives will affect the specific procedure of a Training Aids consultant while he is planning a set of aids for an Oregon school teacher.

Objectives will affect the plans of the consultant in the following two ways:

First: He must find out or determine the specific objectives which the instructor being interviewed is trying to develop, otherwise the finished aids will not satisfy the instructor nor further his aims. This part of the consultant's work parallels the procedure followed by the Air Forces Training Aids consultants. (See Chapter II)

Second: The consultant must be thoroughly conversant with the aims and objectives of modern education. Otherwise he would not be able to recognize when the instructor was attempting to do something which was not pedagogically sound. Aids prepared to reinforce a faulty objective would not only be a waste of taxpayer's money but they might also do the students serious harm.

d. After the problem of objectives has been settled in the consultant's mind, he is then ready for the next two steps in planning help for the instructor.

First, should the Training Aids Unit produce the aids or can they be obtained better elsewhere?
PLATE 32

HOW THE NAVY PERSONALIZED MATERIAL
WHEN IT WISHED TO TEACH ATTITUDES
DILBERT

That Chinese proverb, "One picture is equal to a thousand words," has been put to work by the Navy's Bureau of Aeronautics to point out the pitfalls every Naval aviation cadet should avoid. Dilbert, star of the poster series, is one aviation cadet who just won't listen. Whether it is his natural cussedness or sheer stupidity, not even his instructors can say. Actually, Dilbert loves to show off. This trait makes it possible for cadets to profit from his mistakes. There are 264 posters in the series, depicting his dismal performance in flying, navigation, ground school, gunnery, etc. Dilbert's deaf-dumb-and-blind flying has had a marked effect on careless Naval aviation cadets who learn pleasantly and safely, what not to do in or with an airplane.
PLATE 33
HOW THE AIR FORCES PERSONALIZED MATERIAL
WHEN THEY WISHED TO TEACH ATTITUDES
THE AAF'S "CADET KNUCKLEHEAD"

**No. 6** in the series of specially prepared drawings used by the Army Air Forces to impress upon cadets what "not to do" while in an airplane.

**Don't**

Lower Flaps When Speed Exceeds 125 M.P.H.

---

**THE AAF'S "CADET KNUCKLEHEAD"**

**No. 4** in the series of specially prepared drawings used by the Army Air Forces to impress upon aviation cadets the "wrong" way of conducting themselves in air.

Cross Roads Where You Can't "See" Always Cross On

Pilot Knucklehead Is A Great Follower Of Roads.

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**THE AAF'S "CADET KNUCKLEHEAD"**

**No. 5** in the series of specially prepared drawings used by the Army Air Forces to impress upon aviation cadets the "wrong" way of conducting themselves in air.

Don't Land Outside Specified Area Without Authority Except In An Emergency!

One Strawberry Ice Cream Cone Please!
This plate illustrates how even technical problems such as dive bombing were personalized.
Second, if an aid is to be produced, which particular type of aid should it be?

The consultant could turn to the experiences of the Army Air Forces Training Aids Unit to find an answer to the first question. (See Chapter II) In this section it was shown that the Air Forces made a segregation of aids into General and Local. The general aids included such items as motion pictures, film strips, and text material which would have general use over the entire nation. The local aids consisted of specific material which would not have national application. These aids included such items as flat pictures, lantern slides, pocket manuals, pictorial tests, models, and study guides.

Aids for the public schools can be classified into about the same groups as those used by the Air Forces. For example, full length sound motion pictures would come in the general group for national circulation because the cost of production would be too great for a state Training Aids Unit. Mr. Burke, the West Coast representative for the Erpi Company, informed this writer that the average cost of production for their films was about $18,000 per subject. Costs like that could not be justified for local production. Also textbooks on topics which warrant national circulation could not economically be produced by a local unit because national publishing houses with
their quantity production methods could produce for much less per unit.

The consultant, therefore, needs to keep in mind the following points when deciding whether or not a given aid is to be produced by the state unit.

(1) Does such an item exist on the market at the present time? If so, there is no point in duplicating it.

(2) Does the subject call for material which would have national or just local circulation?

(3) Can it be produced at a reasonable cost? (Cost will include research as well as production.)

When answering the question, Which aids ought to be produced?, the consultant would need to consider the following points:

(1) Which aids would be best for that particular instructor and which would he prefer?

(2) What would be the relative costs of the various aids in this case?

(3) In general, a variety of aids are better liked than too much concentration upon any one aid.

(4) Does the instructor have facilities for making advantageous use of the aids selected?

(5) Which aids would best meet the needs of the students?

(6) Is the need pressing and does it call for an immediate set of aids or will the Training Aids Unit have
sufficient time to prepare those aids which take a longer
time?

B. Organization of an Oregon Training Aids Unit.

1. Possible lines of command.

The following suggestions may be taken as a starting
point in helping arrive at a decision as to which govern-
mental organization this Training Aids Unit may be es-

tablished.

a. Make the Training Aids Unit a part of the
Department of Visual Instruction.

b. Make it a part of the Education Department
in which case the unit could operate in conjunction with
the Teacher Training and In-service Training sections.

c. Make it a part of the State Department of
Education.

d. Make it a part of the State Library.

2. Suggested crew for beginning the unit.

This study recommends that a small crew be maintained
during the pioneer stages of the work and that adequate
provision be made for expansion of the unit as the demand
grows. It would be possible to carry on all functions of
the unit with the following crew:

a. Consultant.

One Consultant probably will be sufficient at first.
Furthermore, if this person has an adequate background in writing, he can assume all of the duties of the writing crew in the beginning.

b. Writers.

This section can be omitted for a few months until the demand for material is so great that the Consultant can no longer keep up with the writing and carry on his consultative work throughout the state.

The Air Forces also found that the writing could be greatly expedited by hiring a stenographer who had a keen sense of writing and of grammatical form. A stenographer with these abilities costs less than a writer and she can give the Consultant so much help on rewrites that he can carry on the two jobs for a much greater length of time.

One caution needs to be pointed out here, and that is if the hiring of a writer is delayed too long the Consultant will be overloaded. The Consultant will have a pioneering and salesman's job to perform when he first makes his acquaintance throughout the state which will take considerable time and forethought.

c. Artists.

One artist probably will be sufficient to open the Unit. A fast writer can keep from one to four artists busy but the ratio of artists to writers can be adjusted
to fit the local needs.

d. Photographers.

One general photographer will be sufficient at first, but as the Training Aids Unit grows he may soon need a dark room assistant.

e. Printers.

One printer would be sufficient in the beginning. He would be expected to do all the dark room work in making his multilith plates as well as operating the multilith presses. Later he would need an assistant for making the plates and cleaning the presses.

3. Suggested equipment.

a. How to obtain equipment.

Consider the possibility of obtaining this equipment from the Army's surplus stock. Hundreds of complete multilith and photographic units have been set up in the Army posts and most of this equipment will likely become useless to the government in the postwar period. The possibilities are that it will be sold at a small price as surplus stock. The same is true of office and drawing equipment.

b. Amount of equipment needed.

Since photographic and printing equipment is very ex-
pensive when purchased new, it is strongly recommended that an effort be made to completely equip the department when it is first opened. Otherwise the surplus stock will soon disappear and then it will be very difficult to expand the department as the demand grows for teaching material. Therefore, it is recommended that the Unit be equipped in the beginning as nearly as possible like the Complete Air Forces Training Aids Unit.

4. Types of material to be produced by the Training Aids Unit.

The material about to be described is the local type of aid which is designed to meet the needs of individual teachers. The Consultant will have to use considerable ingenuity in designing each aid so that it will fit the specific needs of each instructor. But, in general, he can use the pattern set by the Air Forces as a guide because it has been shown that they were dealing with the same objectives as those common to the public schools. Thus as a further aid to the Consultant, samples of non-strategic Air Forces material will be shown in this paper along with its description.

a. Flat pictures.

The following types may be considered as possibilities:
PLATE 35

FLAT PICTURES

This plate shows some typical flat pictures which were used by the Air Service Command to teach detailed assembly procedures.
(1) Collections from magazines and newspapers.

(2) Original photographs in black and white or hand colored.

(3) Hand made pictures, by the artist.

(4) Copies of hand made pictures where multiple copies are needed. If more than 100 copies are requested, they can be run economically on the multilith press.

(5) Oxalid prints.

This process calls for consideration when:

(a) Only one color is sufficient.

(b) More than 25 copies and less than 500 are needed. It is cheaper than photographic prints and also cheaper than the multilith process when less than 500 copies are required.

(c) But this process is not as satisfactory as the multilith press for reproducing photographs.

The use of flat pictures, made especially of the photographic and artist types, gives the Consultant a splendid opportunity to play up those things which are typical and unique to Oregon. Flat pictures give the Consultant one of his best chances to individualize and personalize the work of the schools. Furthermore he need
have little concern about national competition, because no company has had much success yet in producing sets of pictures for schools over the whole United States. They have usually failed because the topics vary so greatly from state to state and it is too expensive for salesmen to contact all schools.

b. Charts and posters.

When only a few are needed, the artist can make them individually, but when enough are needed for several classes or several schools they can be more economically produced by the silk screen process. As a rule the silk screen process is not economical where less than fifteen or twenty pieces are required.

Posters need to be attractively colored and large enough for a group to see without eye strain.

The samples shown are photographs of some charts used in foremenship training. (See Plates 36-38) The charts were hung in front of the class and discussed by the entire group.

c. Pocket manuals.

Pocket manuals were a development which was extensively used by the Air Forces to individualize and specialize their work. For the same reasons, a Consultant needs to give them careful consideration in an Oregon Training
PLATES 36 TO 38

POSTERS

These plates show typical posters which were used by the Air Forces in their Foremanship Training Classes.
"Bawling out"

1. Will discourage a man from trying
2. Will leave a man sore

3. Is done in anger
4. Is done in presence of others
5. Is done without checking facts
6. Is usually unjust

Bawling out Never Works
REPRIMANDING

1. Is done calmly
2. Is done when boss & worker are alone
3. Is done only when deserved
4. Includes facts, not "mincing words"
5. Includes encouragement
6. Leaves a man anxious to improve
WHEN YOU TRAIN A NEW MAN—

DON'T TELL HIM WHAT NOT TO DO!
TELL HIM WHAT TO DO!
Some characteristics of pocket manuals:
1. They are pocket size as the name indicates.
2. They have only one topic treated in a given manual.
3. They are profusely and functionally illustrated so that the pictures can carry a big share of the thought.
4. They supplement the regular text material by bringing out or clarifying points not well handled or omitted by the text.
5. They deal with either theory or application.
6. They are usually produced on the multilith especially when limited quantities are needed.
7. They are especially designed for individual study.
8. They often supplement a given course when a wide variety of different manuals are needed.
9. They are cheap and fast to produce. (The Air Forces found that most of the manuals could be written and produced in about one to two weeks.)
10. They seldom have more than twenty to fifty pages per manual.

Points for the consultant to keep in mind while selecting topics for pocket manuals:
1. Avoid competition with national publications by
PLATES 39 AND 40

POCKET MANUALS FOR TEACHING THEORY

These two plates show six typical pages from a pocket manual which was designed to teach the fundamental theory back of the term "horsepower."
If you pick up a weight of 50 pounds...

...and put it on a table that is 4 feet high...

...what is HORSEPOWER?

HOW much work did you do?

You can measure the weight by pounds.

You can measure the distance by feet...

and

You can measure work - by foot pounds.
You could probably pick up this weight in a few seconds...

A little girl would need several minutes to lift 50 lbs. even if she had ropes and pulleys to help her.

You both did the same "foot pounds" of work **BUT!**

You did the work much faster than she did—so you must have more strength—or power—than she has...

**HOW MUCH MORE?**

You measured the work in foot-pounds

You measured the time in minutes—

You can combine foot-pounds and time to measure power.
PLATES 41 TO 43

POCKET MANUALS FOR TEACHING FUNDAMENTAL OPERATIONS

The following three plates show ten typical pages taken from a pocket manual which was designed to teach the fundamental operations of a four-stroke cycle gasoline engine.
4 STROKE CYCLE ENGINE

You know...

...the propeller is turning around

and...

...the engine is making it turn.....

But...

HOW does the engine make the propeller go around
FIRST OF ALL...

WE HAVE THE Propeller

AND THE Engine

AND THE Cylinder

In one cylinder...
...is a piston with a master connecting rod

...this is a master connecting rod...

...The master connecting rod is attached to a crankshaft

UP - DOWN UP - DOWN UP - DOWN UP - DOWN
The piston and the connecting rod push up and down and make the propeller and crankshaft go round.

The problem is...

HOW CAN THE PISTON PUSHING UP AND DOWN MAKE THE PROPELLER GO ROUND AND ROUND
That's simple

... it's just like riding a bicycle

your leg pushes up and down and the pedal goes round and round

The piston and rod work like your knee....

... the rod and crankshaft work like your ankle

So...

when the piston and the master connecting rod go up and down the crankshaft turns around!

and then the crankshaft turns the propeller around
selecting topics of a local nature. For example, "The Fishermen of Astoria" would be a good topic, but the general topic, "Fishermen" could readily be produced by one of the national publishing houses. Also, "Oregon Antelope" would be sufficiently local, but the general topic, "Antelope" would not be. (See Plates 44-46)

2. Many biology and other science books need supplements to make them fit the specific needs of a local community. There is little danger here of competition with the publishers of the texts because they have found it too difficult to get out supplements for each state.

3. Pocket manuals open up a splendid field for local talent and class projects.

4. Select pocket manuals when a connected story needs to be told. If an individual incident needs showing, consider flat pictures or some medium like that.

5. Pocket manuals may have value over several years while flat pictures and posters are often transitory in nature.

6. Make a careful study of the Air Forces Pocket Manuals because many of them deal with topics which have a direct bearing on public school work. For example, pocket manuals on tool use and care have direct application in the industrial arts departments of Oregon. The Air Forces Pocket Manuals not only need to be studied
PLATES 44-TO 46

POCKET MANUALS DEALING WITH GENERAL TOPICS

WHICH HAVE A NATION WIDE INTEREST

The following plates show typical pages from pocket manuals on general topics which are published by Row-Peterson Company, Evanston, Illinois.
Seeds That Travel by Air

Dandelion seeds have parachutes that are very much like the little parachutes of the cattail seeds. Dandelion seeds, then, travel by air just as cattail seeds do. If you dig up every dandelion plant in your yard this spring, you may have a whole new crop of dandelions in your yard next spring. Dandelion seeds may float into your yard from your neighbors' yards. They may fall down to the ground in your yard and grow.

Cottonwood seeds have parachutes, as you know if you live near a cottonwood tree. On windy days in the early summer, the air sometimes seems to be filled with flying cottonwood seeds. You may have seen piles of them along fences or along the sides of a street.

Milkweed seeds have parachutes, too. When a milkweed pod bursts open, the seeds sail away on the wind. The next time you find some milkweed seeds, feel the down that makes their parachutes. It is as soft as silk.

Clematis seeds have parachutes, but they are not very much like the parachutes of cattail seeds or dandelion seeds or milkweed seeds or cottonwood seeds. Fastened to the covering of each clematis seed there is a little curled tail that looks like a tiny feather.

There are many other seeds that have parachutes. Some people call the seeds with parachutes "flyaways." The pictures on this page and on page 17 show you the dandelion and some "flyaways" you have not been told about.

Cotton seeds (page 19) have so much down in their parachutes that a cotton plant often looks as if it were covered with fluffy snow-balls. The down on cotton seeds is called "lint." It is very useful. All cotton cloth is made of it. If you have a cotton dress or shirt, you may know that the lint was taken from many, many cotton seeds to make the cloth for it.

The seeds of a maple tree are carried by the wind, but they do not have any parachutes made of soft down. They have wings instead. The wings are fastened to the tight coverings the maple seeds are wrapped up in.

Elm seeds have wings, too. The wings of elm seeds are not the same shape as the wings of maple seeds, but they carry the seeds through the air in the same way.
forward more than a foot a year, perhaps not so much. Of course, the plants over which the ice moved were killed. They could not run away. Great trees as well as little plants were crushed into powder under the moving ice. In one way, however, the plants did move south. No one plant could move, but the seeds of a plant could be carried toward the south and could grow into plants there. As the ice came closer, some of the seeds of these plants might be carried farther to the south, and so on and on.

After thousands of years—fifty thousand, perhaps—the climate changed again. It grew much warmer in the north. The ice melted back little by little from the edges. The animals that had been driven to the south came back to the north again—not the same ones, of course, but their great-great-many-times-great-grandchildren. Many of the kinds of plants that had been driven from the north came back, too. Some of them, indeed, went farther north than they had been before.

The “summer” did not last very many thousand years. Again the ice sheets pushed their way southward. Again thousands and thousands of square miles of Europe and North America were buried under them. At last “summer” came again, and the ice melted back. This “summer” was very long. Then it was followed by another “winter” of thousands of years, another “summer,” and still one more long “winter.” The map on page 33 shows how much of North America was once covered by ice. Try to picture what you would have seen if you could have flown in an airplane then from where San Francisco is now to what is now New York.

You would have seen no signs of the great ice sheet until you got past the Rocky Mountains. Of course, the Rocky Mountains had huge glaciers in the high valleys, but these were not a part of the great ice sheet itself. As you flew over the plains east of the mountains, you would have seen signs of a very cold land. You would have seen, for example, mastodons and mammoths. In what is now Nebraska you would have come to the western edge of the ice sheet itself.

From the time you reached the edge of the ice sheet until you finished your journey, there would have been almost nothing to see but ice. From high in your plane, the whole northeastern part of the
Scorpions of today do not have backbones. Neither did the scorpions of long ago. The first land animals with backbones did not appear for a long time after the days of the first land animals.

A Giant of the Coal Age

Two hundred and fifty million years ago much of North America was low and swampy. In the swamps great forests grew—forests that later turned to coal. Many of the trees of the forests were giant ferns. Others were giant club mosses and horsetails. There were not yet any trees like those that make up our great forests of today.

In and out among the trees flew huge dragon-flies. Some of them measured more than two feet from wing-tip to wing-tip. They were the largest insects that have ever lived. There were giant cockroaches and enormous spiders, too. Near the edges of the water, snails crawled along the ground. There were also, near the edges of the swamps, animals of a much more important kind—amphibians.

The word "amphibian" comes from two old Greek words. One means "both" and the other "live." Most amphibians live a part of their lives in water and a part on land.

Toads and frogs are among our modern amphibians. Their eggs are laid in water. The tadpoles that hatch from the eggs are very much like little fish. They are shaped like fish, and they breathe with gills. Little by little they lose their fish-look and their fish-ways. Legs grow out, and lungs develop in place of gills. When they are full-grown, they are air-breathing animals, well fitted for living on land.

The amphibians were the first animals with backbones that learned to live on land. One of the early kinds of amphibians was a giant amphibian named Eryops (er-y-ops).

Eryops was over eight feet long. As you can see from its picture, it looked like a huge frog with a tail. Many scientists think that this giant animal had three eyes—two where you would expect its eyes to be, and one in the middle of its forehead. Its mouth was enormous—it could not very well have been
carefully, but also there is justification for making an immediate attempt to obtain the original multilith plates for those manuals which are usable in the public schools; otherwise, much of this valuable war-time material is likely to be lost to public education.

The following pictures show samples of pocket manuals which need no modification for use in the industrial arts departments: (See Plates 47-49)

d. Study Guides.

Since the Armed Forces used millions of study guides an Oregon Training Aids Unit may wish to give this type of aid careful consideration. Study guides are quite flexible and can readily be made to apply to local teaching problems. They can be used in conjunction with almost any teaching material, although the Armed Forces made outstanding use of them with their training films.

The Armed Forces study guides usually consisted of two parts; one was a guide for the instructor and the other a guide for the trainees.

The instructor's portion usually gave the instructor the following assistance:

1. Suggestions on how to teach the unit, such as how to carry out the four steps in a lesson, namely:
   a. The warm-up or introduction.
   b. Presentation.
PLATES 47 TO 49

POCKET MANUALS WHICH MIGHT BE USED
BY INDUSTRIAL ARTS DEPARTMENTS

These plates show typical pages from those Air Forces pocket manuals which dealt with topics so nearly like those in high school industrial arts departments that they might be used without modification in the high schools.
Some of these grades come in both Single cut and Double cut:

- **Bastard**
- **Second-cut**
- **Smooth**

The teeth in a SMOOTH file are usually close together.

The teeth in a ROUGH are usually far apart.

A smooth file will generally have many small teeth and a rough file will generally have a small number of large teeth.

**IF YOU WANT TO BE A GOOD MECHANIC**

YOU WILL NEED TO KNOW

ONLY 8 SHAPES

- Flat
- Hand
- Triangular
- Square
- Round
- Pillar
- Half-round
- Knife-edge

**You will**

NEVER . . . Hammer on a file
NEVER . . . Use a file for prying
NEVER . . . Use a file after the teeth are clogged with bits of metal
NEVER . . . Use a file without a handle

FREQUENTLY Use a file card to remove metal particles

ALWAYS . . . Keep files away from water or moisture to prevent rusting

ALWAYS . . . Protect the surface of a file

ALWAYS . . . Clean the surface of the part to be filed before filing it
THE Screwdriver is made so you can gently tap on it with a hammer.

Do this only when the slot of the screw is clogged with dirt, paint or rust.

When you use a screwdriver to tighten a Screw:

1 SELECT AND PLACE the right screw in the screw hole.

2 MAKE THE FIRST few twists with your fingers.

3 GRASP THE HANDLE with your right hand.

4 USE YOUR LEFT HAND to guide the tip into the screw slot.

5 TURN OR TWIST the screwdriver in the direction that the screw turns to tighten. This will generally be . . . . .

6 CONTINUE TWISTING until the screw is properly tightened. Be very careful that the screwdriver does not jump from the slot during the last few twists.
If you want to be a good mechanic......

Never hammer on the end of a screwdriver.
c. Application.

d. Testing.

2. Supplementary material such as library references and visual aids. For further comments on instructor's guides, see Plates 23 - 28.

The trainee's portion of the guide often was planned as "self-checking" sheets. They contained all types of questions, and some guides made liberal use of pictorial tests. The questions and suggestions were aimed to help the trainee make certain that he thoroughly understood the lesson.

The following samples of study guides may be taken as typical of those which had a wide distribution in the Air Forces: (See Plates 50-53)

e. Pictorial tests.

Testing is always a problem in any school, and testing received such serious consideration in the Air Forces that their testing units often compared favorably in size with their Training Aids Units. The Training Aids Units cooperated closely with the testing units in the preparation of "Pictorial Tests."

Since the writer spent approximately a year helping develop pictorial tests for the Air Forces, pictorial tests will be the phase of testing which will be treated in this paper. The following comments and suggestions will
PLATES 50 TO 53

STUDY GUIDES
FILM - AIRCRAFT WELDING -- NAVY

1. CONTENT AND USE:

a. This film presents detailed information on aircraft welding.

b. The following topics are covered:
   (1) The correct procedure of connecting the gages and torch to the cylinders.
   (2) Characteristic types of flames obtainable on the torch.
   (3) Correct manipulation of the torch in forming the bead on a flat surface.
   (4) Care of equipment.
   (5) Suitable clothing for welders.

c. The film can be used effectively in a beginning welding class.

d. This film presents basic information on welding, and will be ideal to show to students during the first week in the shop.

e. One lesson is sufficient for the study of this film.
2. RELATED READING MATERIAL ON THE LESSON:
   a. TM 1-430.
   d. Aircraft Welding by Elzea.
   e. Aircraft Material in Welding by J. B. Johnson. (This book is especially good on structure and aircraft welding).

3. OTHER TRAINING AIDS:
   a. Good and bad samples of welding.
   b. Picture or actual cutaway model of an oxygen regulator valve.
   c. Samples of good torch tips and damaged ones.
   d. Portable welding equipment.
   e. T.F. 10-165.

4. PREPARATION OF STUDENTS BEFORE SHOWING FILM:
   a. A good preparation for this film would be to show T.F. 10-165 a few days before.
   b. The instructor should make sure the students understand that in T.F. MN-92-J, they are to look for three main topics:
      (1) Care and operation of equipment.
      (2) Proper procedure of running beads on a flat surface.
      (3) Characteristics of three types of flames obtainable from a torch.
   c. The nomenclature is rather clearly explained in this film; so there is little need to refer to technical terms until after the film has been shown.

5. DIRECTIONS ON SHOWING THIS FILM:
   Rather long lists of equipment and procedures are given at various places in this film; so the instructor may wish to stop the projector frequently to make certain that the students clearly understand each portion. A reshowing will also help the students organize their information.
6. ACTIVITIES FOLLOWING THE FILM:

a. Topics to be Explained by the Instructor:

(1) Hose connections which have ground seats and which must not be tightened too tightly (excessive pressure may damage them.)
(2) Oscillation of the torch (must be carefully controlled in order to minimize expansion and oxidation.)
(3) The two methods in common use in adjusting the torch for a neutral flame. (Some operators prefer to turn the oxygen valve, instead of acetylene, while they are adjusting the torch.)
(4) Why the oxygen cylinder should be opened slowly until it is wide open, while the acetylene cylinder should be opened slowly, but not to exceed one turn.
(5) Why good butt welds must have 100% penetration.

b. Topics for Class Discussion:

(1) The wide use of Oxy-acetylene in joining ferrous and nonferrous materials.
(2) Reasons for protective caps on cylinders.
(3) The need for wearing pants without cuffs.
(4) Precautions to be taken when cracking cylinder valves and purging hose.
(5) The method used in adjusting working pressures on the torch.
(6) The importance of the welder relaxing while he is welding.
(7) The various torch angles to be used under different welding conditions. (Bring out that care must be taken to protect the torch from excessive heat. The angle of the torch is determined by the job to be done. Why?)
(8) Welding technique. (Emphasize especially the way to apply the rod to the puddle.)
(9) The characteristics of the three kinds of flames to be used on a torch.
(10) Characteristics of good and bad beads.
g. Demonstrations:

1. Students could try to pick out samples of good pieces of welding among samples of poor pieces of welding.

2. Students can study the operation of an oxygen regulator valve by looking at pictures or examining an actual cutaway model.

3. Students could separate damaged torch tips from good torch tips.

4. A demonstration of portable welding equipment should take place.

5. Students should actually weld before the class in order that others may criticize their work.

h. Write in Further Activities of Your Own Planning:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

- 4 -
be given in order that they may serve as a guide to the consultant of an Oregon Training Aids Unit when he starts out to help teachers prepare pictorial tests for their classes.

(1) The opportunities for pictorial testing:

The fields for pictorial testing have still been only partially explored. However, the experiences of the Air Forces indicate that the following may serve as a starting point for those who are just beginning to work with this medium.

(a) Performance tests
(b) Manipulative skills
(c) Nomenclature
(d) Sequence of operations
(e) Safety
(f) Inspection
(g) Proper tools and tool usage
(h) Overcome language difficulties of foreign students

(2) Types of pictorial tests:
(a) Sample boards
(b) Printed pictorial tests
   1. photograph
   2. ozalid
   3. ditto
   4. mimeograph
   5. multilith
(c) Lantern slides
(3) Construction and design of pictorial tests.

(a) Sample boards.

These usually consisted of actual samples and specimens mounted on boards. The boards were small enough to be passed along easily in the class and also small enough to be filed away in standard filing cabinets. The samples generally were wired to the boards. Multiple choice questions were commonly used. For example, a board would contain three incorrect samples and one right one. (See Plates 54-55)

(b) Printed pictorial tests.

These were of a wide variety, such as multiple choice, matching, nomenclature, and inspection. The multiple choice type would consist of three wrong pictures and one correct one. Matching tests were a common type for determining correct tool use. In this case the student would match the picture of the correct tool with the picture of a process.

There were several methods of reproducing the printed tests.

1. Photographs

These could be either photographs of originals or of drawings. Photographs made on regular print boxes in the dark room were preferred when not over 25 copies were needed. If less than one hundred copies were needed the
PLATES 54 AND 55

SAMPLE-BOARD TESTS

These two plates are examples of multiple choice, inspection type tests. Board number 8 was used to determine a trainee's ability to distinguish between the correct and incorrect installation of safety wire.

Board number 5 was used to determine a trainee's ability to distinguish between safe and unsafe airplane cables.
Hunter Electro Copyist was satisfactory.

2. Ozalid prints

This process is economical when more than 25 copies and less than 500 are needed. It has the disadvantage, however, of limiting the tests to only one color. (See Plates 56-59)

3. Ditto process

The ditto process is highly satisfactory up to 100 copies. Ditto copies can be made in a wide combination of colors, but this process has the disadvantages that it cannot reproduce photographs, and its master copies are expendable. The art work for making a second master copy is almost as expensive as for the first.

4. Mimeographed copies

The Air Forces Training Aids Unit did not find this method satisfactory. It was too slow and the quality too poor.

5. Multilith copies

This process is usually considered too expensive when less than 500 copies are made. It does, however, have the following advantages.

a. It gives a high quality product.

b. A wide combination of colors can be used.

c. Photographs can be as easily reproduced as line drawings.
PLATES 56 TO 59

PICTORIAL TESTS

These plates are examples of the pictorial questions which were used for examining truck drivers.
DIRECTIONS

Place an "X" beside the picture which shows the best driver. It may be that none of the drivers are doing what you believe they should do. In that case place an "X" beside the driver who comes the nearest to doing the right thing.

SAMPLE QUESTION:

PICTORIAL DRIVING TEST
SBASC TESTING UNIT
DIRECTIONS

Each page in this set of questions pictures a driver in serious difficulty, while the drawings in the circles show various things the driver might do to avoid trouble.

Answer each question by placing an "x" on the small circle which shows the best thing to do.

SAMPLE QUESTION:

PICTORIAL DRIVING TEST
SBASC TESTING UNIT
PICTORIAL DRIVING TEST
S B A S C TESTING UNIT
PIATES 60 AND 61

PICTORIAL TESTS

These pictorial questions were used for testing trainees in the parachute repair division.
PLACE AN X IN THE SQUARE SHOWING CORRECT PLACE TO STOW PILOT CHUTE.
PLACE AN X IN THE SQUARE THAT SHOWS IN WHICH END OF THE PACK YOU SHOULD INSERT THE PILOT CHUTE.
PLATES 62 AND 63
PICTORIAL TESTS

Pictorial questions used for testing trainees in the airframes repair division.
WHAT WOULD YOU DO TO:

REMOVE FUEL TANK

CHECK BELOW THE DRAWING WHICH SHOWS THE FIRST THING TO DO IN REMOVING THE TANK.

UNFASTEN TANK

DRAIN TANK

JACK UP WHEEL

TAKE CAP FROM TANK
WHAT TO DO:
BEND TRIM TAB IN THE UP POSITION ON AN ELEVATOR.
CHECK PICTURE BELOW WHICH SHOWS THE RESULTING MOTION OF THE AIRPLANE.
PLATE 64

PICTORIAL TEST

Sample pictorial question for trainees in the engine repair division.
SAMPLE QUESTION

REMOVE FRONT HALF OF CRANK CASE
d. The multilith plates are not expendable and can be filed away for future use.

e. The minute details of a drawing can easily be reproduced.

(c) Lantern slides.

These may be made of pictures, drawings, and written material. They are rather expensive to make in quantities, although the testing units found that they had the unique advantage of giving the instructor absolute control over the timing for each question.

(4) Suggestions on the use of pictorial tests.

The Army Air Forces did not have the time to make a long, analytical study of the relative merits of pictorial tests versus verbal tests, but they did arrive at some rule-of-thumb "don'ts," which they considered worth observing.

(a) Don't use pictorial tests when the teacher's emphasis has been upon words instead of things.

(b) Don't use pictorial questions which require long wordy explanations.

(c) Don't go to the time and expense of preparing a pictorial question if that question can be stated just as effectively in words.

One last suggestion to observe is: Stick men figures are preferred because the artists claimed that they took
about one-eighth as long to prepare as the regular three dimensional drawings of men. Furthermore, Dr. D. W. LeFever, of the University of Southern California, felt that stick men were probably superior to the three dimensional type because they did not distract from the main point of the entire drawing. Tests should not have distracting influences.

f. Lantern slides.

Since lantern slides have had a wide usage both with the Armed Forces and the public schools, the following suggestions are given the Consultant to help him to decide whether or not to make slides for a given school:

(1) Many types of lantern slides can readily be made by the students, and it is questionable whether any sound educational gains will come from having a Training Aids Unit prepare those types of slides which can easily be produced in the classroom. (See Plate 65)

(2) Several companies are producing slides for national distribution. Their products have enjoyed a rather brisk sale during the past ten years. It would be useless duplication of effort to make slides in general subject fields. (See Plate 66) It would be far better for the consultant to keep constantly in mind that one of the chief advantages of a Training Aids Unit is that it can produce local materials which enrich the schools
PLATE 65
HANDMADE LANTERN SLIDES

Typical lantern slides which could readily be made by the children of each school.
Hand, hat, hen, and October with corresponding drawings of a hand, a hat, a hen, and a face looking out a window. There are also drawings of ducks with labels: one duck, two ducks, three ducks, and four ducks.
PLATE 66

COMMERCIAL LANTERN SLIDES

Sample lantern slides which are produced by large companies and distributed on a nation wide basis.
with those things that cannot be obtained elsewhere.

(3) Many schools will not have the facilities for making lantern slides of photographs. Here is a need for the Training Aids Unit.

(4) Many schools will not be able to make natural color photographs which will be suitable for lantern slide projection. Here is another open field for the Training Aids Unit.

(5) The duplication of slides will be another opportunity for the Unit, because there will likely be many schools wishing duplicates of slides owned by neighboring schools.

(6) In addition to making slides for local schools, the Training Aids Unit will likely wish to make sets of slides which will be stored and circulated from the State Visual Library. These slides will be typical of Oregon, yet have usefulness over the entire state.

   g. Models, Specimens, Dioramas, etc.

Materials of the above nature constitute another big phase of visual education. Some articles in this class are very expensive to make while others are easily made by students. The following suggestions are offered as guide lines for the consultant.

(1) The policy which applied to handmade lantern slides might also be applied to the production of models,
specimens, etc., which can readily be made by students. Namely, it might prove of questionable value for a Training Aids Unit to produce items which a school can easily make. It would be better for the consultant to be in a position to give the instructors suggestions and helpful hints on what to make and how to make them.

(2) The Training Aids Unit could render a valuable service with models and dioramas which are complicated or expensive to make. They could follow the policy set by the Alameda County (California) Schools in which these pieces were circulated by the visual department, thus relieving the individual schools of owning or making expensive items. (See Plates 67-73)

(3) It may be that the Training Aids Unit would eventually find it advisable to maintain a shop for making models and exhibit materials. But before such an expenditure is made, the following two suggestions are listed for possible investigation:

(a) Have various schools in the state make pieces for the Training Aids Unit. This policy will help tie-in the local schools with the State Unit. It will supply valuable experiences for the students. Many schools already have shops adequate for the preparation of this type of visual aid, thus eliminating the need of the State Units spending any money for such equipment.
PLATE 67

MOCK-UPS

The Air Forces used a great many mock-ups of this general type. Some of these may now be obtained by schools from the army's surplus stock.
11. Install pressure regulator.
12. Install wing flap operating cylinder.
13. Install flap actuating cylinder.
15. Install tail wheel operating cylinder.
16. Install master brake control.
17. Install bomb door operating cylinder.
18. Install engine-driven hydraulic pump.
19. Install hydraulic hand pump.
20. Install wobble pump.
22. Install power brake.
23. Install pressure tank or accumulator.
24. Install hydraulic shock strut.
25. Install reservoir.
26. Install "Y" oil drain and dilution cock.
27. Install engine primer.
28. Install all line-work for accessories (when necessary).
29. Install nose wheel uplocks.
30. Install fuel cocks.
31. Install supercharger regulator.
32. Install propeller governor (if necessary).
33. Install shuttle valve.
34. Install tail post assembly.
35. Install exactor control.
36. Install fire and load valve.
PLATES 68 TO 70

MODELS

The models shown in these plates were made by the WPA for the Alameda, California County Schools.
WORKING MODEL OF A MODERN HAND LOOM

MODEL OF A DIESEL SHOVEL

WORKING MODEL OF A GAS ENGINE
(A small light flashes as piston reaches firing point.)
PLATES 71 TO 73

DIORAMAS

The dioramas shown here were made by the WPA for the Alameda, California County Schools.
BLOCK DIORAMAS

One of these is made for each country of the world - showing percentage of major divisions of the country; typical topography; and underlying geological strata.

Diorama

A Hudson Bay Fur Trading Post
CONSERVATION DIAGRAMS SHOWING:

(1) Cleaning Land

(2) Improper Cultivation

(3) The Result

(4) Land Saved by Proper Cultivation
CIRCUS PARADE
(Model for primary classes)

SCALE MODEL OF FORT SUTTER
(b) The Alameda County schools organized a government project for making these Aids. Many thousands of items were made at no cost to the county, other than that for raw materials. The federal government assumed the expense for labor and equipment. It may well be, that something of this nature would be an ideal postwar federal project for the Training Aids Unit to sponsor.

h. Motion pictures.

There is an opportunity for the making of motion pictures by a Training Aids Unit, but two cautions are given here to help safeguard the consultant:

(1) Many large companies are producing educational sound films for national distribution. It would be inadvisable for a Training Aids Unit to try to compete with these companies on universal topics because the Unit will not have comparable facilities for research and technical perfection.

(2) Full length motion pictures are very expensive to produce. This point is well brought out by an article in the January 1944 issue of the California Journal of Secondary Education: "What Army and Navy are Teaching us about Visual Aids." (51) The author firmly believes that postwar animated films will need large companies to produce them, and even then they may need federal grants in order to get started.
The question now arises: Just what are the opportunities for the making of movies by a Training Aids Unit? A plausible answer is: **Movie shorts** for the special needs of Oregon students because this type of picture overcomes the two difficulties above and at the same time, furthers the Unit's objectives for individualizing and personalizing the local schools. A sample of an excellent topic for a local movie short may be found in the files of the State Visual Instruction Department. Last year this department was called upon to make a movie short showing in detail the correct motion of the hand in picking strawberries. This picture filled a definite gap in the visual educational field, yet it was of such a local nature that no national producer seemed interested in it.

1. **Film strips.**

The same comments apply here which were made in the preceding section regarding motion picture production. Therefore, limit the production of film strips to those topics which meet the local or special needs of Oregon students. Even the Army Air Forces was not satisfied with the general production of film strips by their local depots. They finally centered all production of general topics in five major centers. The Hal Roach Studios in Culver City, California was one of them.
5. Monetary considerations.

The following suggestions are given to stimulate thought on the part of those who will have responsibility for the financial problems of initiating the unit.

a. Cost of operating the Unit.

The best approximation which can be given here is to list some of the salary ratings which were common in the Air Forces Training Aids Units. These salaries can serve only as guide lines for two reasons:

First, it is impossible to predict how postwar civilian salaries will compare with those paid by the Air Forces in war time.

Second, Air Force salaries never closely paralleled those paid by individual states.

(1) Consultants

These men usually carried CAF-9 ratings, which meant that their average yearly income was about $3,900.

(2) Writers

These salaries ran from $2,400 to about $3,000.

(3) Research men

Their salaries ran from about $1,800 to $2,400.

(4) Artists

These averaged from about $1,800 to $2,200.

(5) Photographers
There was a wide range here, depending upon experience. The average ran from about $1,800 to $2,700.

(6) Printers

These salaries ranged from about $1,800 to $2,200.

(7) No attempt will be made here to list the incomes of assistants in the various departments because of the wide variation due to the fact that they were usually unskilled and had to be trained for their specific duties.

b. Suggested means for defraying expenses of Unit.

(1) State budget

This plan is suggested first, because it is the one which has proven successful in California for the operation of its state elementary textbook publishing unit.

There is room for caution in setting up a Unit which depends solely upon local school subscriptions or assessments. The reasons for this caution are:

(a) Special privileges will come to students in the wealthy districts. California has operated its state textbook unit on the policy of equal opportunity for all.

(b) Those districts unfamiliar with the possibilities of training aids will be the last to subscribe to a unit, yet they may be the very districts which need the most help.
(c) The Air Forces found that it was a more satisfactory procedure if "no strings were attached" to the consultant when he conferred with the instructors. In this case, the consultant and instructors could concentrate their undivided attention upon one point. Namely, what could they do to improve the teaching?

(2) NYA or WPA

There may be a revival of federal relief agencies in the postwar period. If such proves to be the case, the Training Aids Unit may wish to take full advantage of them for supplementary assistance. Many city visual departments profited immensely from these agencies during the prewar period.

(3) Armed Forces Rehabilitation Program

It is too early yet to foresee the trends a rehabilitation program will take, but many organizations are already making an effort to be included in the government's projects. For example, the California State Library Association is now making plans for utilizing the efforts of hospital occupational therapy wards in the production of visual aids for the regional libraries. This much is likely, the government will be busy for years to come in helping rebuild and retrain the disabled veterans. Therefore, it may be advisable for the Training Aids Unit to make every effort to find a place for these veterans. It
is quite possible that many posts in the Unit could be filled by disabled veterans who are seeking assistance and retraining.

(4) Student work experience program

Student work experience received considerable notoriety in the "Antioch Plan" and is now being carefully studied by the junior colleges of California. Its closest parallel in the West is found in the practice teaching requirements of present day education departments. Since the students receive only apprenticeship pay, it would be possible by this means to operate a Training Aids Unit for only a small fraction of the normal cost.
CHAPTER IV

SUMMARY

1. Educators throughout the nation have shown a keen interest in the immense training programs of the Armed Forces. But the question continually arises, "Can our schools teach the GI way?"

Educational literature is filled with the pros and cons of the above question, but nobody has yet attempted to determine just what or how many of the outstanding features of GI education can be adapted to the public schools. The purpose of this thesis is to show how one phase of GI education, namely, the Air Forces Training Aids Unit can be adapted to the Oregon Educational System.

2. Description of an Air Forces Training Aids Unit.

The depot Training Aids Units were for the purpose of preparing instructional material. The Units had facilities for writing, drawing, photographing, printing, or manufacturing all types of instructional aids. Most of the aids were produced for the specific needs of individual instructors. Samples of the different aids commonly produced are shown in the body of this thesis.

3. Problems in adapting an Air Forces Training Aids Unit to the Oregon Educational System.

a. Are there common objectives to both the Air
Forces training program and the subject matter fields of the public schools? A survey of the literature of both groups showed that:

(1) There are elements of "education" and training in both, but the Air Forces placed the greater stress upon "training."

(2) The following four objectives were basic to both groups: skills, attitudes, appreciations, knowledge and ability to use it. The difference lay in the amount of emphasis placed upon each objective. For example, the Air Forces consistently placed the greatest stress upon skills.

b. Can any or all of the various instructional aids, such as posters, flat pictures, pocket manuals, study guides, pictorial tests, lantern slides, models, motion pictures, and film strips contribute to the four objectives listed above? There are no comprehensive statistical studies to give information on this point. But a survey of the literature showed that leading educators in both the Armed Forces and the public schools believe that the type of instructional aids produced by a Training Aids Unit do make a significant contribution to the four objectives listed.

c. This section discussed the possibility of organizing an Oregon Training Aids Unit along much the
same pattern as that common to the Air Forces Units.

If the Oregon Unit obtains its equipment from the Armed Forces surplus stock only a small capital outlay will be necessary. Likewise, it is possible to begin the program with a small crew. There is a possibility that some financial help may be obtained from the federal government. Much the same type of instructional aids could be made by the Oregon Unit as was produced by the Air Forces Training Aids Units.
CHAPTER V

RECOMMENDATIONS BASED ON THIS STUDY

1. A modified pattern of the Air Forces Training Aids Unit warrants consideration for adoption in the Oregon Educational System.

2. An Oregon Training Aids Unit may begin with a small crew consisting of one consultant, one artist, one photographer, and one printer.

3. There will be a pronounced saving if the photography, art, and printing departments are completely equipped with materials obtained from the Armed Forces surplus stock.

4. The feasibility of obtaining financial help from the federal government warrants consideration. Suggested sources of government help to be investigated are the WPA, Veterans Rehabilitation Program, and the NYA.

5. Instructional Aids which might be produced by the Unit are:

   a. Charts and posters
   b. Flat pictures and ozalid prints
   c. Pocket manuals
   d. Study guides
   e. Pictorial tests
   f. Lantern slides
   g. Models, specimens, and dioramas
h. Movie shorts to meet local needs

i. Film strips for the local needs of Oregon students

6. Suggestions for initiating the Training Aids Program:

a. The proper state authorities need to be made acquainted with the possibilities of the program.

b. Oregon's Congressional Representatives and Senators can greatly assist the Training Aids Unit to obtain surplus army material.

c. Since Training Aids Units are new to state educational systems, a preliminary educational program will help promote the project. The Oregon State Teachers Association and Parent-Teachers groups would be ideal organizations to help sponsor the program.
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APPENDIX

INTERVIEW PLAN USED FOR DISCUSSING THE MERITS OF A TRAINING AIDS UNIT WITH CURRICULUM DIRECTORS IN OREGON

I. Outline the general plan of a Training Aids Unit and show how it would operate in the state of Oregon.

II. Ask the following questions:

A. Would the schools patronize a Training Aids Unit if one were established in Oregon?

B. To what extent would your school be interested in such a Unit?

C. Should the unit start on a small scale and build up as the need grows?

D. What difficulties do you foresee?

E. What suggestions do you have for improving the plan?

F. When should an attempt be made to put the plan into operation?

Typical Objectives from the Subject Fields of Business Education, Spelling, Penmanship, Health Education, and Home Economics

The following quotations are taken from a report by the National Commission on Cooperative Curriculum Planning.

"Home Economics.

"An interpretation of the Purpose of Education.

"1. A faith in home and family life based
upon intelligent love and companionship.

2. An appreciation for the need of every member of the family to share and participate in the responsibilities of home and family living.

3. A belief in the necessity for the application of sociological and psychological principles to the problems of human relationships.

4. An understanding of the economic implications involved in the problems of consumption with a shift in emphasis from the home as a production center.

5. An intelligent application of the instruments and agencies of progress to problems of home and family living.

6. An understanding of the educational significance of the home and family in fashioning individual personalities.

7. An intelligent understanding of the rights and privileges of childhood.

8. An appreciation of the possible influences of family mores in determining political and social living in any generation.

9. An understanding of the necessity for acquiring the skills of homemaking.

10. An appreciation of the significance of homemaking as a career, and the contributions of the homemaker to the social good.

"Business Education.

"Objectives.

1. Self-realization.

2. Human relationship.

3. Economic efficiency.

4. Civic responsibility."

These quotations are taken from Washington's State Course of Study.

"Specific Aims.

1. To transfer knowledge acquired in the study of oral composition to written form.

2. To make use of essential punctuation marks.

3. To establish conventional forms.
"Spelling.

"Aims.

"1. To make automatic the accepted sequence of letters in words most commonly needed for expression of thought in writing.

"2. To develop the meaning and use of words to be used....

"3. To develop what is termed a 'spelling consciousness' that is, the ability to recognize, almost instantly, the correct and incorrect spelling of words.

"Pennmanship.

"Aim: Instruction in penmanship in the junior high school is designed to develop rapid, easily executed, legible, and neat handwriting that will function in the conduct of affairs. As in other subjects, the best results will be obtained by an enthusiastic teacher who has mastered the art, and is prepared to illustrate concretely the skill he desires his pupils to acquire."

Developmental Reading in High School
Guy L. Bond and Eva Bond
The Macmillan Company 1941

"Reading Purposes Listed by Students in a College of Education Summer Class Session:

"Silent Reading.

"Information.

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<td>17</td>
</tr>
<tr>
<td>To obtain and act upon directions</td>
<td>24</td>
<td>6</td>
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<td>To verify facts and opinions</td>
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<td>To form an opinion</td>
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<td>To understand a situation</td>
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</tr>
<tr>
<td>To judge appropriateness</td>
<td>2</td>
<td>1&quot;</td>
</tr>
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Commercial Subjects
Course of Study--State of Oregon
Issued by Rex Putnam 1940
Edited by V. D. Bain and D. A. Emerson

"Function of Business Education in High School
"Three rather distinct, though related, functions of high school business education are worthy of special consideration. They may be classified as consumer, prevocational, and vocational.

"All citizens need to understand and appreciate the place of business in American life and to be educated in the common fundamentals of business practice. They should learn to be intelligent buyers and sellers with due regard for both their own business rights and those of others. They should know when, where, and how to seek expert counsel in business affairs. Since the task of the school is the adjustment of the individual into the institutions of society, the high school has a definite responsibility to make this consumer business education available to everyone.

"Such courses as typewriting and bookkeeping, which in the general high school course ought to be taught primarily with consumer rather than vocational emphasis, do have, however, worthwhile prevocational values. Those who have developed proper skill in typewriting for personal use will also have acquired some of the bases for its vocational application. In the same manner, when one has learned the principles of bookkeeping he has gained some definite prevocational ability. Except for definite vocational preparation, shorthand has little justification in high school.

"General Objectives.

"The study of shorthand should enable the student to achieve the following objectives:

"1. To hear—to become sound-conscious so as to hear the correct pronunciation and enunciation of all words and associate the shorthand symbols with the sounds they represent.

"2. To write—to acquire skill and ease in writing shorthand symbols.

"3. To read—to acquire skill in reading shorthand rapidly and accurately.

"4. To transcribe in proper form, with speed and accuracy, all dictated material.

"5. To broaden his general and technical vocabularies.

"6. To integrate with English skill in punctuation, hyphenation, spelling, word usage, etc.

"7. To develop attitudes that make for success:
"a. Desire for achievement.
"b. Feeling of confidence in ability.
"c. Appreciation of the ideal of mastery.

"8. To develop understanding and appreciation of the economic and social problems involved in the commercial life of the community and the nation.

"General Aims and Objectives.

"1. To develop the mastery of typewriting techniques.
"2. To develop typing ability through adequate instruction and practice in the application of these techniques in dealing with practical typing situations.
"3. To develop muscular control and relaxation.
"4. To develop an understanding and appreciation of the use of the typewriter.
"5. To develop the ability to operate and maintain the typewriter as a writing machine.
"6. To develop the ability to typewrite as rapidly and as accurately as is required on the level on which an individual uses a typewriter—personal or vocational.
"7. To develop reasoning, resourcefulness, and self-reliance.
"8. To develop skill in integration of English, such as different phases of grammar, punctuation, syllabication, etc. with typewriting.
"9. To develop and strengthen desirable character traits, emotional stability, and attitudes that will build for a more wholesome personality."

Starch, Stanton and Koerch list the following objectives for Health Education:

Psychology in Education
D. Starch, H. M. Stanton, W. Koerth
D. Appleton-Century 1941
p 622-623

"The Aims of Health Education.

"The aims of health education emphasize psychological as well as physical aspects. They are based upon a more inclusive concept of health than freedom
from disease. Besides the effective functioning of all parts of the body, health implies emotional stability, competence in social behavior, and satisfactory adjustment in conduct. Health education therefore, aims (1) to foster in each pupil the formation of the best possible health habits for his age and environment, (2) to develop ability to choose healthful rather than unhealthful ways of acting, (3) to teach him to cooperate in measures for disease prevention, (4) to develop personal responsibility for community health as well as for his own health, and (5) to help every pupil win and maintain the positive health essential for effective functioning of innate capacities and abilities.

"Psychology contributes to the accomplishment of these aims as its principles are made to function in acquiring health knowledge and developing skills, attitudes and other habitual behaviors conducive to health. Since health literature is a popular source of health information, the psychological aspects involved in reading that literature are important in both teaching and learning. The teacher himself must not only be able to select and read such literature with comprehension, discrimination and judgment, but must foster the ability of his pupils to read with competence. Emotional aspects of such reading must be recognized and taken into account so that pupils may become experienced in the objective attitude essential to clear thinking about what they read in health literature. Pupils and teachers alike should learn also to listen to and observe health information critically and objectively, since so much comes through the eye and the ear.

"Health knowledge to be effective must be incorporated in the experience of the pupil. This is a psychological principle too easily overlooked in merely memorizing health rules and discussing healthful behavior instead of practicing them. Training in transferring knowledge from thought to practice becomes a vital part of health education.

"Health habits, skills, and attitudes are developed according to the same psychological principles that govern the formation of all other habits of body and mind. Because habit formation is so important in health and physical education, a brief review of the steps involved may well be given for emphasis. There must be adequate motivation for
forming the habit, effective practice to make the habit automatic and sure, and satisfaction to the performer in its exercise.

Page 652.

"Training in skill alone is not enough. Music teachers in training are so accustomed to the requirements that they either perform well on some instrument, sing well or conduct, that they may neglect the broader skills of musicianship, instrumentation, harmonization, composition, and general education. Only in recent years have public school music teachers been required to have the more comprehensive and intellectual approach designated by a college degree in public school music.

Page 654.

"Evaluation of Modern Objectives.

"New objectives for the fine arts stress the advantages of their integration with the other arts for the enriched experiences of maturing children. The fine arts should not be artificially separated from the practical or industrial arts. The blending of expression and appreciative functions of the arts as a whole is needed to develop truly esthetic experiences. Therefore, frequent references to the so-called industrial or practical arts will be made with those to the fine arts. The demarcation between the two fields is lessening. Why? Because the fine arts cannot be set off on a pedestal as in the past. They are not a luxury reserved for a fortunate few; they can be enjoyed by all.

Page 676.

"Development of Appreciation and Attitudes.

"Appreciation of the beautiful in literature, painting, music, rhythmical motifs of the dance, architecture, sculpture, or in life about you is an individual experience usually accompanied by some degree of feeling. Many young children are trained to appreciate things in their environment, not necessarily the isolated pieces of art, but ordinary experiences such as the sound of a beautiful voice, the color in a rose, dewdrops on a leaf, snow flakes, the ripples of a sand dune, a wind-blown field of
ripening grain, or frost on sagebrush. They often become aware of these appreciations later in life when a similar experience "moves" them or stirs something inside. In some way, quite unaware, these children had developed attitudes toward nature, toward beauty, and the behavior of persons which later proved to be truly esthetic experiences."