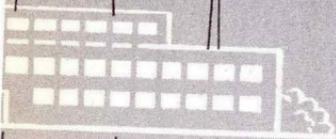


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the
**EVENING SCHOOL
INSTRUCTOR**
and his job

Bulletin 129
of the
Engineering Extension
Iowa State College
Ames, Iowa—1957

in cooperation with
State of Iowa
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Des Moines, Iowa



THE EVENING SCHOOL INSTRUCTOR AND HIS JOB

Revised 1957

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Foreword

This bulletin represents a second revision of a special series of teacher training pamphlets which were published in 1927 by the Iowa State Board for Vocational Education. It is an abridged text for the use of those evening school instructors who are anxious to render the best service to their students.

The original material was prepared by Prof. J. V. Lynn (deceased), formerly trade and industrial teacher trainer for Iowa, in cooperation with a number of other trade education specialists from nearby states.

The first revision (1937) was prepared by Prof. E. S. Baird, Trade and Industrial Teacher Trainer of Iowa State College, and Mr. Harry W. Carmichael, former State Supervisor of Trade and Industrial Education for Iowa.

The wide use of earlier editions of this pamphlet in Iowa and elsewhere, as indicated by the many requests received, has stimulated the preparation of this revision, which has been made by Prof. A. P. Twogood, Trade and Industrial Teacher Trainer of Iowa State College, Ames, and O. H. Beaty, State Supervisor of Trade and Industrial Education, Des Moines. Every chapter has been revised and new chapters have been added. Local supervisors have contributed many suggestions. It is hoped that this bulletin may prove to be of value and assistance to those teachers, local supervisors and superintendents who are responsible for the development of evening school programs for industrial workers.

WAYNE L. PRATT, *Director*
Division of Vocational Education
State Department of Public Instruction

THE EVENING CLASS AND THE INSTRUCTOR

The Group

This bulletin is written for the evening school instructor who is about to teach his first class, with the idea of easing his worried mind. It is also intended as a "refresher" for experienced instructors.

The new instructor is likely to think of schools and teachers and what they did when he was a student. He thinks of lessons and lectures, books, and blackboards, desks and discipline. He wonders what he will do after he calls the roll. He is quite wrong, however, in thinking he will have to conduct an evening class as classes were taught in the day school he remembers.

First, the group will be made up of adults who have left off their childish pranks. They have begun to earn a living and are in school to learn a trade as the means to that end. They will take this more or less seriously and in a businesslike way. They have many other things to occupy their leisure time, and this evening session of two hours, once or twice a week, is an engagement which they wish to keep. The evening class hours are given out of their spare time; therefore this time should be used by the instructor to their advantage.

The instructor must not, they think, waste their time, but must give them some real help. Moreover, this is in most cases all the time they can give to the study. Evening classes should be self-contained unless certain students ask for work to do at home. The instructor cannot, as in day schools, assign outside reading or problems in preparation for the next class. Men are too busy and want to get all they can from class instruction in the time they are giving.

Specific Needs and Individual Differences

Most men come, too, with very specific needs. One wants to get an understanding of roof framing, while another in the same group needs some stair work. If their needs are not satisfied, they will not come back again.

Some, but fortunately only a few, may have their interest centered in things wholly detached from their employment

and come to class just because a friend comes, or just for something to do.

Nor will all of them be equally capable of going ahead with the work. Several may need the same instruction, but in a short time it will be plain that some understand fractions and can work the problems involved and others can not. Most men are sensitive about their lack of education and even refuse to enroll, or they withdraw from the group after enrollment rather than "show themselves up before the others." On the other hand, some are not at all sensitive on this point.

Varying interests and pressing duties frequently cause absence from class. Where a group is to meet twice a week, it is almost impossible to avoid conflicts in dates with lodge and union meetings and what-not. Some are therefore bound to be absent all through the term. This affects the attitude of the absentees toward the instruction being given. They lose the thread, so to speak, of the instruction and become discouraged because they cannot seem to catch on to things when they are there. This is also characteristic of a few who may be regular in attendance. They just do not seem to know how to learn, and consequently become discouraged.

Getting Acquainted

These few statements about the conditions and mental attitudes of an evening school group will suggest to the instructor that he will need to become better acquainted with each man as early as possible. The instructor ought to know some things at the beginning so he may start right with each man, because he cannot conduct his evening class as a grade or high school class where all do the same thing at the same time.

The instructor must know the needs of his group. He will have to use different methods to become acquainted with each one. One good way is to have the men fill out a registration form which asks them to give information concerning their education and experience to aid him in learning their needs and attainments. Another source of information is the foreman under whom they work. If possible, an instructor should get the foreman's opinion on the men, and particularly those who are not attending class regularly or are not doing good work. It is obvious that the opinions of some foremen must be weighed carefully before being accepted. Foremen, like others,

may err in their judgments both for and against certain individuals. A third way is through personal visits with each man. This is the best way to get acquainted with a man, for it provides a chance to ask informal questions and get first-hand information.

The Instructor

Any craftsman, engineer, or other person who is engaged to teach an evening group should take stock of himself as well as the class. If he will do this, he will be more effective as he teaches. In the first place it is assumed that he is a master of his trade, an experienced journeyman worker, or a trained engineer with executive experience. The mechanical and technical knowledge which is to be taught is familiar to him. His knowledge is used automatically every day, and this is exactly as it should be. The more thoroughly skilled or technically trained he is, the more confidence the men place in him at the start. He has the basic qualifications to teach others. But, does he?

Because a mechanic knows how to do a thing is no guarantee that he will be successful in getting others to learn it from him. Learners often are confused and make serious mistakes in their efforts to do as they were told or shown. Are they to be blamed for this? Maybe; but possibly not. The chief reason is that the skilled mechanic may have forgotten how he struggled to learn these same things some years ago, while now they seem so easy. He therefore slights some teaching points in his presentation, or misses them completely. Certain parts about a job, on the other hand, are spectacular or vivid, and these stand out unduly in presentation. The instructor's problem is to determine the relative importance of all the teaching points about a job, and nothing should be taken for granted unless it is known to have been learned.

The chief point of the instructor's difficulty is that the new work being undertaken belongs to another trade. Instructing is as truly a trade as is toolmaking, and it has to be learned just as an apprentice learns toolmaking. If a toolmaker were asked to come over to a friend's house and repair his TV set, he would immediately say, "Get a TV serviceman, that is not in my line." To be consistent, a toolmaker when asked to teach an evening class would say, "Get a teacher, that is not my

trade." But the big point about it all is that in trade training, the instructor must know both trades. He has to know "what" he is going to teach and he must know "how" to teach.

The "what" is the mechanical trade and the "how" is the teaching trade. One of them is already known. The other is just about to begin and can be learned. A skilled mechanic can train an apprentice how to do trade work. In the same manner, a skilled instructor can teach a beginner how to teach. There are "teaching tricks" just as there are "tricks of the trade."

The Skill of Teaching

This new "trade" is not difficult to learn. It is just some common sense applied to the method of going through a complete teaching job. It is done by performing a series of teaching operations which will become automatic with practice just as in any trade. Each operation is carried through by means of teaching tools, and the new teacher will soon learn how to select the right teaching tool for the teaching operation just as he knows how to pick up the right trade tool for a particular trade operation. The following chart indicates the similarity between the procedures in teaching and in production.

Production and Instruction

A Comparison

Read each column downward before comparing

The Mechanic

Takes raw material
Works according to a set of specifications, blueprints, etc.
Performs a number of operations upon the material
By using certain tools common to the mechanic's trade
With the result that he has a house, water system, machine or what-not.

The Instructor

Takes a green or partly trained learner
Works according to a specified course of study and teaching outline
Goes through a series of teaching operations upon the learner
By using selected teaching methods common to the teaching trade
With the result that he has a carpenter, plumber, machinist, or what-not maker.

As in the mechanical trade, it becomes easier to carry on in teaching as one practices it. In other words one learns to do by doing, but everyone realizes that it is slow and uncertain to

learn how to teach in that way. If a new teacher could have the assistance of someone throughout the early experimental hours of teaching, it would help over many a hump.

This is just what the state vocational education offices do. They want to have knowledge of the difficulties of a teacher so he may be given assistance. When a teacher finds himself up against something which is giving him trouble, he should contact his local supervisor of vocational education. If the supervisor cannot assist, he will write to the teacher trainer or the state supervisor of trade and industrial education.

This pamphlet has been written to help the local instructor with his problems. The state vocational education offices wish to help him get the best possible start.

Telling and Teaching

For a general introduction of the teaching problems, the following will explain briefly what teaching is:

First, telling a learner how to do something is not teaching him. Telling or lecturing is usually the least satisfactory form of teaching. Often a teacher says, "I've told him time after time and still he doesn't know the first thing about it." That is why he doesn't know. He was told, but not taught. For example: An apprentice or evening school student asks, "What is $\frac{1}{4}$ of $\frac{3}{4}$ inch?" To reply, " $\frac{3}{16}$ inch," means nothing to the learner beyond an answer. If he can recall it a week later, it is just memory and not understanding. If the instructor starts a little dialog something like this, he will get the student to answer his own question through self-reasoning:

Student: What is $\frac{1}{4}$ of $\frac{3}{4}$ inch?

Teacher: Look at your rule and tell me what is $\frac{1}{4}$ of $\frac{1}{4}$ inch.

Student: $\frac{1}{16}$ inch.

Teacher: How did you get that answer?

Student: I saw that each quarter inch was divided into quarters so there would be sixteen of them in the full inch and therefore one of the little spaces would be called a sixteenth inch.

Teacher: That is the right way to get the name of the space at any time and with any set of figures. Always deal with one of each kind until you get the name of the resulting kinds. If $\frac{1}{4}$ of $\frac{1}{4}$ inch is $\frac{1}{16}$ inch, then what is $\frac{1}{4}$ of $\frac{3}{4}$ inch?

- Student: That is what I asked you. I don't know.
- Teacher: You just said a while ago that $\frac{1}{4}$ of $\frac{1}{4}$ inch is $\frac{1}{16}$. How many $\frac{1}{16}$'s would there be for each $\frac{1}{4}$?
- Student: There would be one for each quarter.
- Teacher: And how many quarters did you ask about?
- Student: I asked about three quarters.
- Teacher: And if you get $\frac{1}{16}$ for each of the three, how many $\frac{1}{16}$'s will you have?
- Student: I would have three sixteenths.
- Teacher: Well, that is what I could have told you, but you have found out for yourself.
- Student: I see now that what I have to do is to get the name of my final part first and then find how many of these there should be.
- Teacher: That is correct, so what is $\frac{1}{2}$ of $\frac{1}{8}$, $\frac{1}{2}$ of $\frac{5}{8}$, $\frac{1}{4}$ of $\frac{5}{8}$, $\frac{1}{8}$ of $\frac{5}{8}$, $\frac{3}{8}$ of $\frac{5}{8}$?
- Student: Dealing with one of each kind first: Halves of eighths give sixteenths—answer $\frac{1}{16}$.
Halves of eighths give sixteenths—answer $\frac{5}{16}$.
Quarters of eighths give thirty-seconds—answer $\frac{5}{32}$.
Eighths of eighths give sixty-fourths—answer $\frac{5}{64}$.
Eighths of eighths give sixty-fourths—answer $\frac{15}{64}$.
- Teacher: By this method you can get any of these correctly and speedily.
- Student: I see now how it is done, and before it was impossible. I will not have to try to remember bare figures hereafter.

This little dialogue shows that true teaching is setting up situations to enable the learner to think for himself, to reason things out in little steps at a time until he finally understands. When he does, he will show it in his expression and statements, and there will be no doubt about whether he has learned what has been taught. In a snapshot taken out of focus everything is blurred. That was just what the student's thought was like about those parts of the inch at first. The teacher, simply by asking questions carefully and logically, brought the student's mind into focus so that he could get a clear picture of the thing which previously had been so confused in his mind. Learning is focusing thought on ideas, and teaching is helping the learner to focus.

There is illustration of a teaching device in the previous paragraph. The learner's attention was called to an idea which was *familiar* to him, the blurred photo. An important part of teaching is causing the learner to call to mind *old ideas* for the

purpose of attaching new ideas with them. When new information is associated with the old, the total store of knowledge is increased. That process of consciously associating new information with old is learning; and when the instructor directs the learner so that he can get the right information associated, he is teaching.

The following example shows how association of ideas works out in any question in arithmetic.

New idea—A 7-inch vent pipe is to be made.

Old idea—Circumference of circle is $3.14 \times D$ (Diameter).

Conclusion—Length of sheet iron for this pipe will need to be 3.14×7 plus laps.

The instructor's job here is to get the learner to pick out from all his old ideas just the right old one to associate with this new one, and from that connection, to draw the conclusion which will be needed.

Showing and Teaching

Showing is often thought to be teaching. By showing is meant that someone performs the operation of a job while the learner looks on and tries to remember what the demonstrator did. Failure in this instance results because the learner does not know what to look at or look for, and he gets no help. To illustrate: A machinist was showing a learner how to cut V-threads on a lathe. When through, he let the learner take over the work and went away. The first thing the learner did was to start the tool so that it cut right along the top of the thread instead of in the V. He could not understand why, so he called the demonstrator (he could not be called an instructor), who said, "Did you not see me looking at the thread dial?" The learner did not know there was such a thing as a thread dial, much less notice that the demonstrator was looking at it; yet the learner was held responsible for the error. No, showing is not teaching!

This would-be instructor thought he was demonstrating, but demonstrating is much more than mere showing. A demonstration as used in trade instruction is a combination of showing, explaining, and directing the learner's attention to definite features of the process. It includes causes, reasons, effects, questions, and all the "whys" and "what-fors." It is just another

way of getting the learner to use his knowledge in the solution of a new problem through the association of the new with the old.

The Tools of Teaching

The teaching trade has many kinds of “tools” to use on the learner. Two of them have been discussed: namely, “suggestive questioning” and “demonstration.” Another is the “lecture” method. The teacher often does not need to demonstrate anything, but he must explain through words. As pointed out previously, “telling” or its longer counterpart, “lecture” is not looked upon with too much favor as a teaching tool in evening school instruction. It seldom completes the job of teaching. When the instructor is the only one possessing the information, lecture must be used. It may be combined with other teaching “tools” to make it more valuable. “Lecturing” should always be limited to very short intervals.

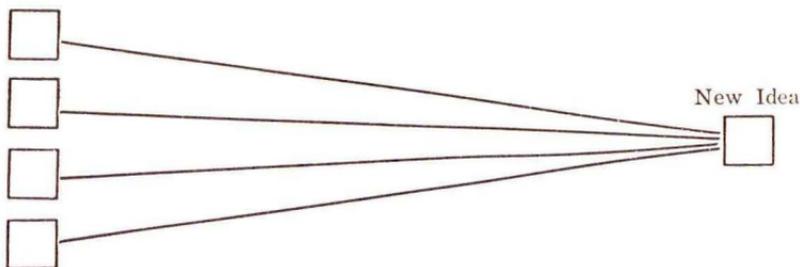
Another tool is “recitation.” This is a way of getting the learner to express what he knows so the instructor can check on him. To promote learning, the student must become a participant in the process, rather than a spectator. Mental activity or “doing” on the part of the student is always necessary in learning. Teaching must stimulate mental or physical activity.

The use of other devices in the field of illustration will be explained in a later chapter.

How People Learn

Another way of explaining the learning process is illustrated in the following diagram.

Old Ideas → Focused on the New → by Comparison and Contrast (study) → through Motive Power of Interest



We learn new things in terms of what we already know. The more old ideas that are brought into play in the process of learning the new, the more effective is the learning process.

In other words, the new idea must be *seen* from *several angles*. This adds to the vividness or intensity of learning through increased mental activity, as pointed out above.

That there are five senses through which the learning process is affected must be recognized. The talking picture is more effective than the silent type of movie. One reason is that the viewer is using two senses, "seeing" and "hearing," in the former; and one, sight only, in the latter. The more senses brought into play in a learning situation the better the results. This explains why demonstration (showing combined with proper explanation) is so effective as a teaching device. Greater mental activity results in greater learning.

"Feeling" is a third sense, highly useful in teaching a skill. It is brought into teaching by setting up situations involving the development of the sense of touch and muscular coordination by the learner. Using a micrometer, or a file, or a wrench, or learning to type, all require a highly developed sense of touch and muscular coordination. These must be developed through proper practice.

Psychologists have, through tests, concluded that one will, over a period of time, remember about one-tenth of what has been heard ("telling"), three-tenths of what has been seen ("showing"), and seven-tenths of what has been done ("doing"). A much better learning situation is provided when all three teaching tools are used in combination. While it may be somewhat exaggerated, there is much truth in the oft-repeated statement: "One picture is worth 1,000 words." Apparently the originator of the statement did not philosophize on "one deed," but it must be worth "many thousand words."

Success in any craft is measured by the ability to "do," to perform the work for which one has been trained. A large amount of knowledge about one's field of work may provide great personal satisfaction, but people are employed mainly for what they can "do," not what they know. Acquisition of knowledge and its conversion into performance ability is the major objective of the whole vocational education program.

Interest Necessary

The learning process is carried on, as has been said, through making comparisons and contrasts of the new with the old. This process requires mental and sometimes physical effort which is correctly called study. This process is tiring to the learner; it is work and there must be some incentive to cause the learner to carry on this work process of comparison and contrast, or study. This motive power is interest.

One of the important jobs of the evening school instructor is to stimulate and direct the interest of the learner so he will want to study, to analyze and solve his problems. The adult who comes to an evening class is of course interested or he would not attend. The successful instructor will take advantage of this and further stimulate interest on the part of every learner. Volumes have been written on this one subject, *interest*. In this brief discussion only slight mention is possible. The instructor will need to devise ways and means of building and maintaining this all-important factor of interest. The subject of interest will be mentioned again in a later chapter.

Direct Teaching and Self-Study

If teaching is causing the learner to think, then learning must be thinking about things, comparing and contrasting ideas, looking for causes and effects. A learner may do this without the aid of an instructor, which we call self-study. Self-study can be better done, however, if the instructor supervises or oversees it. Some evening school students are able to do self-study under supervision, while others require the formal methods of direct teaching.

ORGANIZATION AND MANAGEMENT OF EVENING CLASSES

Registration

Adults registering for the first time in evening school classes will gain favorable or unfavorable impressions of the school within the first few minutes of attendance. To make this impression most favorable, the administration of the school should be certain that all details of registration are carried on with dispatch and in businesslike fashion. If this is done and the students find themselves assigned to classes under enthusi-

astic and friendly instructors who are ready to get right to work, they are quite certain to respond in a most satisfactory manner.

Registration usually is the work of the evening school director and not of the instructors, and each should be in his shop or classroom with an eye-catching sign on the door indicating what is to be taught there, who is to teach it, and an invitation to come right in. Either in advance of the evening school or on the first night, the student will fill out a card with his name, telephone number, address, employer, trade, date, and subject to be studied. There may be a fee required for tuition, material, or for use of texts connected with certain courses. A receipt for the fee should be shown on the card. A duplicate or stub of this card will be given to each student to take to his instructor showing that registration has been completed.

The instructor should then secure such personal information from his students as he wishes to use. This is best done by handing out a slip of paper on which such information as the following may be obtained:

1. Educational background. This information should be tactfully obtained.
2. Previous evening school work.
3. Correspondence courses.
4. Employment information—type of work performed in a trade, length of time in the trade, supervisory experience, etc.
5. Special skills or knowledge he expects to gain from course.

All enrolled should be made to feel at ease. This is best done by getting them at work as soon as possible on the first evening.

Equipment

A comfortable and quiet classroom adds much to the success of evening school work. The room need not be elaborate, but there must be enough light to see without eye strain. Vocational requirements call for standard industrial machines and tools for shop courses, and laboratories for vocational course should be equipped with adequate scientific apparatus. Often, however, a resourceful instructor can construct apparatus which will explain things better than that supplied

commercially, but the point stressed here is that there must be instructional equipment and material to aid the teacher. Industrial instruments and apparatus are usually much better for teaching and learning than the homemade or experimental equipment. An adequate supply of books, pamphlets, note paper and drawing supplies should also be on hand.

When instructors of evening classes use shop or laboratory equipment also used by the day school, there is always possibility of friction on such matters as the condition in which the equipment may be left, and in accounting for breakage, misuse, or disappearance of materials or tools. There must be a definite understanding, and sincere cooperation will be needed where two classes use the same equipment. The evening class instructor should learn just what are his responsibilities for room and equipment.

Conduct of Classes

Instruction must start on time. If the hour advertised is 7:30 and the instructor waits until 7:45 for late comers, he is doing a grave injustice to those present. For the same reason the sessions should stop on time. This tends to make students work harder while there and gives a more businesslike attitude to everything connected with the school. Moreover, it is only fair to the instructor, for there are always some individual students who have questions and problems to bring up after the session when the instructor can give them undivided attention.

Individual instruction during class time may lead to unequal distribution of the instructor's time. This may be either conscious or unconscious, but in either case, it leads to a claim of favoritism on the part of those who do not get as much attention as they think is due them. Sometimes it is justifiable to spend more time with the slow than with the fast workers, but this may be overdone. What is more objectionable is for the instructor to give his attention exclusively to the bright and socially agreeable students. Nothing should be done that may be looked upon by members of the group as an indication of favoritism. It is well to visit with students frequently for shorter periods than to spend the same amount of time in one visit.

The instructor must get his material ready beforehand so that he does not have to take class time to hunt for chalk,

books or materials. Equipment should be inspected so it will be ready when needed.

Give Personal Attention

Each member of the group who works faithfully to master the assignments should be given approval for the effort whether he actually succeeds or not. Instructors too frequently fail to give a word of encouragement, such as, "Well, Jim, you worked hard on that one, and the next will come easier. You are coming right along." These heart-warming statements do much for the success of the work of the instructor.

Even the slowest member of the class, who has become discouraged and who has been absent frequently, will return if the instructor makes a special effort to get him back. He should be called on the phone to inquire why he was absent and to assure him that he was missed. The same procedure will work with the indifferent ones. A post card or letter to the absentee often helps. A close personal tab should be kept on each student. It pays big dividends for the investment of a little effort.

Class Records

The bookkeeping part of an evening school instructor's work is confined to records and reports. Records should be kept of all supplies, showing amount received, to whom issued, amount given, charge or cash received, and balance on hand. Record of attendance must be kept. Names may be called aloud for the first few meetings and later marked quietly at any leisure time. It is essential that attendance records be accurate. These records are reported to the State Division of Vocational Education. They are also needed where certificates of attendance are issued.

Certificates

Certificates are always valued by those attending evening schools. These may be issued to all, or only to those who attend at least a certain minimum number of times, and have done satisfactory work. Certification is specifically the work of the director, but recommendation comes from the instructor who is, therefore, the one to evaluate the effort put forth by students on the assignments. These evaluations are made throughout the term.

These brief notes will convey some idea of how to get started. The suggestions are brief and to the point. The person who intends to continue to teach evening classes should plan to make a more complete study of how to teach and how to manage classes. Additional* information may be secured from the local vocational education director.

METHODS OF TEACHING

Review

In the first part of this bulletin learning and teaching were briefly referred to with the idea of defining these terms. The learning process is a sort of mental clearing of ideas, a sorting out of suitable old ones and putting them to work on the new ones to produce bigger or better ideas or to enrich the detail of a former one. It is a mental juggling act with ideas, wholly within the field of association through reason. Teaching, therefore, must aid the learner to do this. Simply stated, teaching is "setting up situations whereby a learner may acquire knowledge, skill and attitudes." We all are learning something every day, and some of us are teaching quite frequently when we are not aware of it. It is a perfectly normal situation, as natural as our eating and sleeping. The question is, can we make it businesslike when we undertake to do it in an organized evening school?

It has been stated that telling and showing alone could not be considered teaching. They must be used, but in connection with something else which makes the telling and showing become teaching. It will pay to take a closer look at this "something else."

Teaching the Lesson

A job is any assigned task whether of long or short duration. It is performed by going through a series of operations in a certain order, with the result that each operation advances the workman a definite step forward in the completion of the job. When a letter is to be typed, the stenographer does the job by:

1. Inserting the paper and carbon under platen roller.
2. Typing the message.
3. Removing the paper and carbon.
4. Inserting envelope in machine.
5. Typing address.

6. Removing envelope.
7. Signing the letter or delivering it for signature.
8. Folding and enclosing letter and sealing envelope.
9. Filing carbon copy.

Here are nine distinct steps or operations all correctly arranged in their order for completing the job. Likewise, any lesson is a teaching job, and it is performed by going through a series of steps or operations. Instead of nine steps, as above, there are four in trade instruction. As shown in the comparative chart, these teaching operations are performed on the learner. In teaching a person how to type a letter, it is true that the instructor would go through the operations on the machine. But at the same time the nine manipulative steps above are being taught, the instructor is actually performing four teaching operations on the learner. That is the reason the instructor needs to know two trades, one of which the beginning instructor probably knows little or not at all. The teaching job or lesson is performed by going through the following steps or operations:

1. Preparing the learner (Preparation Step).
2. Presenting the new ideas and operations to the learner (Presentation Step).
3. Tryout of new ideas and operations by the learner (Application Step).
4. Follow-up of the learner to make sure that he can operate alone under normal supervision (Follow-up Step).

The Preparation Step

A brief review was given at the beginning of this chapter for the purpose of preparing the reader for what follows. It was to set him to recalling ideas that he had acquired, and which he could use. These ideas are like hooks in a clothes closet, and the reader is to hang some new ideas on them. The educator calls it "building on present knowledge." It can also be likened to laying the foundation for a building. As the super-structure cannot be constructed until the foundation is in, so the learner cannot build his conclusions unless he bases them upon former ideas which he is able to recall. The preparation step in the lesson, then, is to get the learner into the correct frame of mind, creating a *feeling of need* for what is to be presented.

This may be done in several ways, but the usual method is to ask suggestive questions. By means of a few questions an instructor can help the learner recall his former knowledge on any particular topic, and recognize the need to acquire further information or skill. This will be about the only method needed with night school students.

The preparation step should be as short and interesting as possible. Two or three well-thought-out questions are sometimes enough to do the trick; however this step must be complete before proceeding to the presentation step.

The preparation step, as well as the other steps of a lesson, must be thought out before the lesson begins, so the instructor can proceed confidently. This "thinking-out" is called lesson planning, and it should be done in writing. An example of the preparation step and the preparatory ideas to be used follow:

Lesson Topic: *How to Saw a Board Square*

Preparatory ideas:

1. Examination of poorly sawed end on a board.
2. Examination of a buckled saw.
3. Both are the results of an improperly used tool.
4. Very few use a cut-off saw correctly.
5. It is a simple operation when one knows the seven "kinks."
6. Do you know these "kinks"? (J.O.P.)

In the preparation step just outlined the instructor has brought the learner into a state of mind where he is thinking about poorly sawed boards and damaged saws. He was led to recognize that he is among the many who cannot use a saw properly. If this is resented at first, the learner is brought into line with another idea which shows up vividly to him that probably he is short on the seven "kinks," so he wants to know what they are. This is just the state of mind the instructor wishes him to have, so when he is focused on an idea something like "what are these seven?" he is then ready to receive them. This is called the "Jumping Off Place" (J.O.P.), and the teacher is now ready to present the lesson.

The Presentation Step

In this step the new information or skill is set forth for consideration by the learner in the light of what he knows already and has just recalled. The presentation is a series of teaching points properly arranged as an answer to the "focus" question

of the learner. This can be illustrated by giving those which correspond to the previous preparation:

Teaching Points

1. Proper method of gripping saw in hand.
2. Method of holding the board securely.
3. Position of the body.
4. How to guide the saw in starting.
5. How to guide the saw in following line.
6. Correct degree of pressure throughout the cutting and return strokes.
7. How to make the finishing stroke.

The instructor will have prepared on paper this list for his guidance in presentation. When actually presenting the seven points, he will use some method or "teaching tool" best adapted to making them clear. In this case nothing can equal a "demonstration." To demonstrate means to use the same tools and materials as used in the trade and which the learner will use. It simply means an exact reproduction of the operation, accompanied by discussion, questions, and answers intended to so direct the learner's thinking that he receives and digests the new ideas as they come up in the demonstration. In this way, the instructor is getting him to use all possible senses to obtain knowledge of the teaching points. He sees, hears, and at this point, feels them in imagination. Like the photographer with his films, he *develops* his new conclusions, but they have not yet been put in the *fixing bath*.

Using Teaching Tools

The instructor can use methods or "teaching tools" other than demonstration. He may decide just to talk it over; describe it in words. This second "teaching tool" is called the "lecture" method. He asks no questions but simply explains things and lets the learner take them in or not, according to his ability. The instructor who makes a word-picture of his lesson, and relies only upon that, is liable to find that the learner did not take in the new idea. If the idea is simple enough from the learner's point of view, or if the learner is an experienced man, the lecture method may sometimes be all that is necessary to get it safely across. It saves time if it can be used.

A third method or "teaching tool" is the illustration. The

preacher or lecturer illustrates his discourse by numerous stories and examples. They are word illustrations to supplement his lecture. Another type is the picture illustration. Drawings or sketches may be made or motion pictures and photographs may be shown by the instructor as he talks about his new idea. Impressions of these aids enter the learner's consciousness by the eye while the words enter by the ear, and the two ways strengthen the learner's impression. Still another type is the model illustration where the instructor uses working models or mechanisms intended to clear up details of the operation. Cutaway sections of valves, steam traps, motors, turbines, and all kinds of laboratory apparatus are examples of this method of putting ideas across successfully.

A fourth method or "teaching tool" is used sometimes with mature learners who have enough experience to make it safe. The instructor gets the learner to perform an "experiment" and directs him as to what to do and what to look for, but leaves him to make up a report of what he finds out. It is not so frequently used in teaching trade skills, but finds a common place in trade science courses in either physics or chemistry laboratories in the evening school.

The method selected for the presentation step will depend upon three factors, all of which must be considered in the planning of the lesson. First is that learners will vary and what might be successful with one may not be with another. The instructor soon finds this out through experience with different students. Second is the kind of lesson to be taught. Some kinds may be successfully taught by illustration and others may require demonstration. Third, the conditions under which the teaching is done. Lacking some demonstration or illustrative material, the teacher may be compelled to present it by the lecture method. No matter what the material is or the needs of the students, the instructor will find it decidedly to his advantage to use practical illustrations and practical trade problems in his presentation. This is not easy to do unless he always puts himself in the learner's shoes so he can see things as the learner does.

The Application Step

Teaching would be very easy if the presentation step were the end. The learner needs something more before he or the

instructor can be certain that he knows what was taught. A learner might say, "I think I know how to saw correctly; I stand so and so, and hold the handle so and so," and so forth, to the end of a word recitation. This might be accepted as proof if it were a lesson on the multiplication table or the decimal equivalents of the inch fractions on a common rule. To have the learner recite is a generally accepted method of making an application of his new knowledge, but this is true only when a lesson is suitable for that method. The recitation may be either oral or written. It would not be satisfactory in the sawing lesson, however, for the only sure method is to try to saw a board as his observation and consideration of the teaching points may direct his muscles. He must perform the job itself. This, then, is a second method of *fixing* the teaching points. Teaching must be fixed just as photo film must be for permanent results.

Recitation and Performance

The application step of the lesson is the *fixing* operation, and the two common methods used are recitation and performance of the job. It is often good practice to use both, for a fundamental law in teaching is that the more ways of expression used, the more permanent is the impression. After the demonstration of the way to saw the board is over, the instructor could review it by a recitation and writing the points on the chalk board; then finish with trial on the job.

Application Checks Teacher's Effectiveness

The purpose of the application step is to check the effectiveness of the instructor's part in the teaching. If the learner fails to perform satisfactorily, he will need to be "coached" over his mistakes until he can perform satisfactorily. Theoretically, no teaching is done in the application step; but sometimes in the presentation step a teaching point is forgotten, and now it must be filled in with the others. In actual teaching, poor presentations are corrected and missing points are supplied.

One application may not be enough to satisfy the instructor that the learner has grasped the teaching points. Skill and speed at this point are not important, but the learner must know the correct procedure. The ideas are repeated until all are *fixed* securely. Many instructors fail by passing into the

follow-up or testing step too soon, with complete failure as a result. Every effort should be made to prevent mistakes.

The Follow-Up

“Now,” the instructor may ask, “haven’t I just been testing or following him up? What else is there to do? He has shown me that he can do it correctly.” True, but the purpose of the step was to repair errors. The instructor stood by while the student performed. Both were on the job. But he will not have the instructor with him always. He will not feel safe unless he can do the job “entirely on his own.” The foreman for whom he works is going to say to him many times, “It is up to you. You are hired because you know what to do. I am here to get production, not to teach.” In short, the foreman puts it up to the instructor to see that the learner can go on the job prepared to work under normal supervision, so far as this particular lesson is concerned. That is why he must be tested. Both the instructor and the learner must be satisfied that he can do it without help.

The method of carrying out the follow-up step may be much like the application step. That is, the learner may be given an oral or written examination, quiz, or recitation; or he may be tried out on the job, without prompting or any assistance. The learner must feel the atmosphere of the shop and not of the school. He must think of the instructor as his foreman. This makes it appear as if the follow-up step were not a part of the instruction process at all; but it is. No instructor could leave it out and know whether he was a success or a failure. He must have it as a part of his job—the last operation on the learner—for here the learner learns something. He learns whether or not he can perform satisfactorily alone.

What if the learner fails on the test? It means that the instructor will have to go over the lesson again, using in most cases though not always, some other method in the presentation step than was used previously. Here are some reasons for failure at this stage:

1. Learner can think and tell well, but cannot perform with his hands.
2. Learner can perform with his hands, but cannot think and tell well.
3. Learner thought he knew, so was inattentive or superficial.

4. Learner is incapable (only true after all methods fail).
5. Learner was afraid he would fail.
6. Teaching conditions were not good; as, fatigue, poor light, ventilation, short time, too many to teach, poor apparatus, and noise.
7. Lesson was not properly taught. The instructor covered too much, chose the wrong method, left out or shortened one of the four steps, assumed that the learner knew something already and found differently in the test. The instructor lacked patience and tact, did not plan the lesson ahead of time, did not get demonstration material ready ahead of time, did not write out a lesson plan at least in outline.

If failure results, it will be necessary for the instructor to check up the cause, then plan carefully to repeat the lesson.

TEACHING PROBLEMS

Several items of importance to good teaching should be discussed. They bear little relation to one another, hence their inclusion as a miscellaneous collection under the topic of teaching problems. In this list are the following items: *Questioning, Getting Side-Tracked, Trial and Error, Teach Correct Method Only, and Sustaining Interest.*

Questioning

Briefly, there are two kinds of questions: test or review questions in which the instructor seeks to know what the learner has retained about previous lessons, and development questions in which the instructor leads the learner to think out something for himself by suggesting old ideas and having him link them with new ones.

Test questions should be so worded that if the learner does not know, he cannot answer. For instance, a machinist may be asked if he can use a micrometer. He may answer either "yes" or "no," but in doing so he conveys no idea as to his skill or knowledge. The question might have been, "How many turns of the micrometer barrel are equal to one-tenth of an inch?" If he knows how to use one he will say "four," and if he does not, he simply cannot answer the question. Do not use catch questions. To ask what kind of lubricant is used when turning cast iron gives a wrong impression for none is

used, and the learner is not being fairly treated. Do not use a bad practice question. Men, if experienced, are not expected to know how to do things the wrong way. Be sure all questions are definite. A "How do you do?" question may often be very indefinite, like "How do you mix paint for a priming coat?" Answers may be "thin, with lots of oil," "in a bucket," or "with a stick." They are all correct for the question asked, but the first is the only one which tells what the questioner wanted. Make it impossible for the answerer to say anything else. Sometimes questions are so worded that answers can be picked out of the question by the suggestive way it is asked. If a painter should say to his apprentice, "Do we put paint on a house to protect the surface or to make it look better?" the latter gets his cue from the question and says, "Both." It would be much better to ask, "Why do we paint the exterior of houses?" and have the apprentice dig up the answer.

A prime guiding principle is that the instructor must decide what answer he wants and then so state his question that only that answer can be given if it is to be correct.

Development questions are not given to test knowledge, but to lead thought. They go in chains, one growing out of the preceding one. That is, they are arranged in a logical order of reasoning from link to link. Frequently they spring from the answer just given to the previous question, because the instructor does not know just what direction the learner's thought may go. Example of a development chain from a lesson on the action of glue in joining boards together.

1. Q. Why do we rub or press the glued surfaces together?
A. To squeeze out the glue.
2. Q. Is all of it squeezed out?
A. No, only if there is too much.
3. Q. What becomes of the rest?
A. It stays between the boards.
4. Q. Then the boards are not touching each other?
A. Yes, they are.
5. Q. Then the glue really has no space to occupy between the boards?
A. No, it squeezes into the pores of the wood.
6. Q. What does it do there?
A. It fills them up.
7. Q. What effect will the glue have when "set"?
A. It will be hard and act like tiny hooks.

In the above example, had the learner given answer number 5 to question number 1, a number of questions could have been saved.

An instructor needs to be alert to get the learner back into line again with as few questions as possible. Development questions should follow the principle of reducing erroneous answers to the impossible or absurd. This makes the learner think.

A few general rules on questioning may be helpful.

1. Avoid asking questions that can be answered by "yes" or "no," unless followed at once by a "why" question.
2. Do not make any suggestion of the answer.
3. Take care to word questions so that the learner has no doubt in selecting the desired answer from among several which might be correct.
4. Make questions brief but clear.
5. Make questions simple for slow thinkers, but challenge the good thinker by giving more difficult ones.
6. When wrong answers are given, do not discourage by ridicule or even neglect of them. Better to acknowledge it as your error in not asking the question properly and ask it again differently.
7. If the instructor is questioning a group of learners, he should ask the question first so that all may get the answer ready, then he should name the one to answer aloud. This keeps all members "on their toes."
8. Distribute questions without any set order. Should the instructor ask one who possibly knows the answer, or one who does not? Which has the best effect on the rest of the group, a wrong or a right answer?

Getting Side-Trackd

With a group of learners it is very easy to get away from the purpose of your lesson. Frequently a learner, because of his curiosity, will ask about something of interest to himself. Possibly it may be of interest to the others and possibly not. The instructor must decide quickly upon its value to all. If worth the time to all, and treatment can be brief, time should be taken for it, but the instructor should get back to the lesson

topic at the earliest opportunity. If a discussion is not advisable at the moment, the question should be acknowledged as a good one and arrangements made to take it up personally after the lesson is over. Such a promise should always be made good. In general, such interruptions are not desirable because they break up interest in the lesson and it is difficult to get all the group back into line again. The instructor should be guided by the degree of applicability to what he is discussing. Sometimes the interjected question may be very remote. With individual instruction, it is not so pressing a problem; but an instructor will do well to keep any lesson in hand, and see that he accomplishes what he intended to teach.

Trial and Error

This has reference to the question of how far an instructor should let a learner discover for himself how to do certain things. Originally all things were learned that way, and new things today are being added through experimental effort. Schools are needed to shorten the learning process for the mass of society. At the same time learners cannot be fed with a spoon. They should rarely be told what they can be *led* to find out for themselves. Notice, the word is *led* not *left*. The instructor on the job should encourage the learner to self-activity which is the force resulting in knowledge.

Teach Correct Method Only

Where there is one best way of doing some operation with tools, and any other method is clearly not so good, it is undoubtedly a mistake for the instructor to demonstrate wrong ways under the impression that he is warning his learner against them. It is an error on two counts in that, first, some learners may become confused and afterwards are not quite sure which one was the right method, and, second, some learners will deliberately do it the wrong way either out of curiosity to check up on the instructor or out of natural obstinacy to show that they will do it their own way.

A single method in demonstration is usually more easily followed up in the application step, but there are times when an instructor may teach different correct methods that are equally efficient. A common example of this situation is found in the carpenter's trade where mortise and tenon construction is

secured by use of draw-pins, wedges, keys, or locked dove-tail. The plumber also may use the union coupling, right and left coupling, or the running thread and lock-nut type of connecting parts of a water system. All are equally correct in these examples, so all may be taught.

Sustaining Interest

Interest is the driving power which gets action or effort. No member of a night school can learn without the exercise of effort; and interest is that state of mind which causes him to give attention to something. The instructor can create or increase interest on the part of his students by making use of certain devices called interest factors. They act like crowbars or jackscrews in that they force learners out of an inactive rut or hole. The instructor must study his learner and then select from the following interest factors those which he can use with greatest success.

1. *Curiosity.* This is natural to most people, and it never grows old. They always want to know the why and how of everything which comes to their attention. This is desirable within limits in every learner, for it is the inquiring mind which makes for progress. The stolid, unimaginative, non-inquisitive fellow who never sees anything to become curious about cannot be urged in this way to progress because he has nothing within to respond. Some other factor may work, however.
2. *Ability to Master.* "Nothing succeeds like success." All children at school are most interested in the subjects in which they do well and this interest in turn makes them get along still better. The apprentice or journeyman who finds that he has the ability to succeed in developing trade knowledge and skill will find it an agent in creating more interest. Confidence increases interest, while discouragement over failure lowers it.
3. *Attainment of Some Objective.* A realization by the learner that what he is learning will aid him in accomplishing something which he has had in mind to accomplish is a driving force. It may be to become expert in workmanship, to get a good paying job, to be promoted to some better position, to buy a home, or anything he cherishes as desirable. If what he is learning now is pushing him more

quickly toward his goal, he will be very much interested in learning more of it. His objectives should be discovered, and what he hopes to do or be.

4. *Self-Respect.* The thought of failure in the eyes of those who expect him to succeed will cause him to renew his interest and effort. This includes in some cases the foreman and men in his department; but it is usually the poor opinion of fellow workers, friends, and relatives which he considers most. An appeal of this kind may start something.
5. *Approval.* A desire for recognition or praise will create additional interest in some learners. It is a legitimate factor within limits, for merited praise of good work is to be expected. Some individuals are not susceptible to it, while others will deceive in order to get praise from instructors. Between these two extremes are all degrees of desire. The desire for approval should be used wherever justified.
6. *Removal of Fear.* Some men are naturally timid and are afraid of the work or of the instructor, and this fear handicaps them. On the other hand, there are learners who are not susceptible enough to the seriousness of life. This is not true of the majority of evening class students because they are here by choice. A little wholesome rebuke of the right kind acts beneficially at times, but it must be done judiciously and privately. With those who are timid the instructor can do much to gain interest by building confidence. Threats inject more fear, which is an emotion, and all emotions restrict the ability to think. One cannot think correctly when angry, jealous, suspicious or afraid.

ORGANIZATION OF TEACHING MATERIAL

In evening school instruction for most trades the conditions are often such that individual instruction gives much better results than the group method. At such times, the teacher will need to organize instructional materials in such fashion that students may be guided at all times, without waiting to be told what to do. Under these circumstances, a series of lesson sheets may be prepared for use of the students. Lesson sheets are also useful when teaching an entire class as a group, because it is not always possible to find a complete text which can be used exclusively. The usual result is that instructors will draw from

a large number of texts to get some few references on each topic which they wish to cover.

Instruction Sheets

Any lesson sheets an instructor would use to aid the effectiveness of his work are called instruction sheets. Instruction sheets are of several kinds. Four kinds are described: the operation sheet, the information sheet, the assignment sheet, and the job sheet. All four will conserve much of the teacher's time in the classroom.

Operation Sheets

Any trade or craft is made up of a number of fundamental operations which reappear frequently in practically the same form. For example, the cabinet maker finds that a great many times he is called upon to fasten pieces together with screws, even though they may be large or small, flat, round or square headed. This fundamental operation of fastening with screws forms a unit of instruction on how to do it. In the same way others might be hand-planing a board to dimension, or preparing wood surfaces for finishing, or boring holes with brace and bits. Any fundamental operation of the trade which is a unit of instruction sufficient to write up in an organized form, can be put into an operation sheet. Sometimes when a text with complete information is not available, it is advisable to write operation sheets to serve as guide sheets.

The instructor should make use of all *references* found in print so that his own write-up may be as brief as possible. An effective operation sheet will point out to the learner where he can find such references by naming author, title, and page.

Next should follow any *elements of the operation* which the instructor wishes to describe further than would appear in the references. They should be accompanied by sketches wherever they will help.

Finally there should be a few well worded *questions* which will cause the learner to think about what he is doing. These usually are of the "why" type. Why does he do this and that? He should have reasons for the things he does in such ways.

These three, then, constitute a good operation sheet. There is no detailed definition for a fundamental operation. It is any unit of instruction which involves trade skill and appears repeatedly in practically the same form. When an instruction

sheet is needed to cover an operation which meets these specifications the teacher is safe in writing it up on the basis of references, elements of the operation, and questions. The instructor should keep in mind that an operation sheet refers entirely to some unit of work which the learner is to learn *how to do*. A sample operation sheet appears in Appendix A.

Information Sheets

Any skilled trade has a large body of knowledge which the intelligent craftsman should possess. Information topics include all items related to materials, tools, safety, trade terms, how to meet the public (for plumbers, electricians, etc.), in fact, anything which should be known. Like the operation sheet, the information sheets each have three factors; namely, *references*, *items of information* not covered by references, and a set of *questions*. The questions may be “why” questions or any kind which will test the learner’s thinking power and check on his digest of the references. A sample information sheet will be found in Appendix B.

Assignment Sheets

These sheets convey no information beyond that to be found in references. They are usually just a set of questions or problems to be answered. A page of arithmetic problems would be an assignment sheet; so would a sheet of problems in sketching. In the latter there might be also some references to texts where solutions of a similar kind are treated. An example is in Appendix C.

Job Sheets

Some times the instructor may desire to use the “job” as a unit of instruction or he may want to study a job which has several unit operations. Jobs are made up of definite combinations of unit operations. In some instances the instructor will want to provide job sheets for student use, and some times he may require the student to work out a job sheet before starting a job. In this case, it becomes a job plan. The job sheet may be supplied the beginner and the advanced learner may be required to make his own job sheet, subject to the instructor’s approval, to provide training in how to plan work. A sample job sheet is shown in Appendix D.

USE OF TEACHING AIDS

Any idea or principle worth teaching can be analyzed or outlined into main points and minor points. It is essential that the learner in most cases be permitted to "see" as well as "hear" these points as they are either told by the instructor or developed through class discussion. It has been pointed out elsewhere that the learner is aided by having more than one of his senses stimulated. The instructor must, therefore, make use of some instructional tools in his teaching.

Chalkboard and Wall Pad

Chalkboards and wall pads, the latter made from newsprint, are the most easily obtained instructional tools in the educational field. No classroom should be without one or both, and no instructor should fail to use them.

With a little practice the instructor will be able to talk while he is drawing. He should talk to the class, rather than to the chalkboard or wall pad. Firm marks should be made with chalk on the blackboard or with marking crayon on the wall pads. The instructor should stand beside the notes or drawing while making them, in order not to hide them; he should write or draw only small amounts at a time before stopping to explain fully; and he should not hurry. When a sheet from a wall pad is filled, it may be torn off and fastened on the wall with thumb tacks or masking tape for later reference. These sheets may be of value later.

When a talk is made, the instructor should write the points as he gives them. Sketches of parts of a machine or of electric circuits may be clearly made with little effort as the instructor talks. The preparation for these notes or sketches will come when the instructor makes his lesson plan in advance of the class meeting.

Making notes on the chalkboard and sketching always helps to hold the attention of the class, since movement attracts attention. The principle of employing motion is universally used in advertising. The instructor should use his action in writing and drawing to get attention. In addition, such practice provides the learner with a "usable record" of the class instruction if he takes the time to also write and draw—in his own notebook.

Prepare Complicated Drawings Ahead

Complicated drawings or charts should be made up ahead of class time; however, it should be remembered that adequate time should be taken to permit learners to become familiar with the elaborate set of lines. When more than one part is to be shown the use of a number of colors in making the lines provides a clearer drawing whether the drawing is made beforehand or during class time. Colored chalk or colored marking crayons are easily obtainable.

When the learner is familiar with the equipment being studied, sketches, pictures, motion pictures, slides and blue-prints are almost as good as the actual thing. Sometimes the actual thing is not available or accessible. Then it is mandatory that one or more visual aids be used.

When an instructor plans to teach the same course more than once, he should give consideration to securing models, making cutaways to reveal hidden parts, and even making his own photographs and slides.

The alert instructor will find many sources of visual aids to use to give eye appeal to his instruction.

Projected Pictures

The real value of visual aids is in the way they are used. This is so important in connection with motion pictures, film slides, and filmstrips that a few rules are provided here for instructors to follow:

1. Be sure that the film is previewed to see that it meets the needs of the group.
2. Prepare a pre-showing discussion so the members of the class will know what to look for when they see the film, and thus get more value from it.
3. Do a good job of showing the film. This may require that the film, or at least parts of it, be run a second time.
4. Prepare a discussion outline to use following the showing. This is the clinching step in the use of a film. Unless there is something in the film that the instructor wants especially to teach at that time it may be just a "show," and therefore wasted time and effort.

CHECKING INSTRUCTION

Common sense rules for checking the quality of learning of members of the class and the quality of the teaching are as follows:

1. Do not announce tests or even call them by that name—merely state that the class is to be given some questions to answer, or a review.
2. Make the questions objective and brief.
3. Let each learner correct his own paper.
4. Permit learner to keep his score confidential.
5. By the questioning procedure, the instructor measures the efficiency of his instruction.
6. Such questioning measures the progress of the learner under the conditions of learning that exist.
7. Reviews given in the form of questions aid the learner in remembering what has been taught.

A short series of questions each evening can be an enjoyable part of the class procedure. Some instructors make it a practice to provide ten objective type questions at the beginning of each session. The instructor gives the correct answers, then calls on volunteers to explain answers. By the discussion the instructor usually learns as much as he needs to know about the progress of the various individuals without collecting the papers. Each individual really competes only with himself.

Some authorities in the field of education state that a test actually tests the instructor to a greater extent than the learner. This seems a little extreme, yet the idea has merit.

The job of the instructor is to teach well enough to enable the learner to learn. It is, therefore, up to the instructor to determine just how much each individual can learn and teach him to that extent. It is likely that instructors may try to teach more than any member of the group can conveniently learn. Of course, the more apt the learner, the more he will learn; and the better the teaching, the more the learner will learn.

For an evening class, long examinations or special examination nights have little merit. Usually only the ones who did well in tests in their childhood days come to examinations any-

way. Many individuals use the first examination night to drop permanently from the class. The fact that an adult comes to evening school is usually evidence that he will accomplish all that he can without holding over him the threat of a failing grade if he doesn't pass the tests. Sample of several effective types of tests are the following:

Objective-Type Questions

Samples of *True-False* test questions (Circle T or F)

1. Grey iron contains a higher percentage of carbon than tool steel T F
2. It is necessary to reduce the speed of the headstock of the lathe when larger diameter materials are turned because of increased periphery speeds at the point of tool contact. T F

Samples of *Multiple Choice* questions: (Write correct letter in space.)

1. The mathematical term "pi" has a value of:
a. 1.3416, b. 3.1416, c. $3\frac{1}{4}$, d. 3.1614 _____
2. The term used to designate electrical resistance is the: a. Ampere, b. Watt, c. Joule, d. Ohm. _____

Samples of *Completion* questions: (Write missing word, words or numbers in space.)

1. The mathematical value of "pi" is: (Give decimal.) _____
2. What is the name of the unit of electrical resistance? _____

RECORDING "USEFUL" INFORMATION

The human mind apparently was never intended as a storehouse for facts and ideas that are not constantly in use. Therefore the instructor needs to devise means of prolonging memory. The instructor can do this to some extent by making sure that the ideas he is teaching are related as much as possible to something the learner already knows, and that the learner has immediate need for what is taught.

The above is not quite as easily accomplished as it might appear. The learner should provide himself with a notebook in which he records useful information which is not readily available to him if he should forget. The ideas associated with

the use of a notebook in school are not always the best. The instructor will probably need to convince the members of his class that the notebook is a useful scheme for keeping a record of useful information.

Successful People Keep Daily Records

All successful people find it necessary to refer to a calendar of appointments and to make notes to remind them of things they have been told and things they have told others. All business offices keep copies of such papers as letters and agreements. Foremen on the job cannot trust to memory the varied schedule they must follow nor the details in connection with new assignments. It is really a mark of intelligence not to trust one's memory. If one will use all the memory aids at his disposal, he can free his mind to think clearly about the larger things.

An instructor who expects his students to make a record of useful ideas will present them in such a way that they can be recorded. The use of the chalkboard, as explained in a previous section, assists students in this regard. If the instructor will point out to his students information that should be recorded, it will spare them from attempting to record far too much, or from recording nothing at all.

When to Take Notes

Note taking is justified whenever:

1. Memory will be aided.
2. Information is necessary for future study.
3. Material is not available from other sources.
4. Information is presented at a faster rate than it can be fully learned.

Whenever note taking is a laborious task, the instructor should resort to the use of instruction sheets. Evening class students will not endure note taking if it is too lengthy or if the value of taking notes is not clearly evident.

APPENDICES

Appendix A

Sample of Operation Sheet

Printing Trade

Operation No.-----

How to Lead Type

References:

(Your own up-to-date references should be listed.)

Elements:

1. When type is to be leaded, place one lead after each line as it is set in the stick.
2. When necessary to spread type to fill a larger space, insert leads above headings, between paragraphs, and above and below display lines.
3. When necessary to contract a leaded article, begin removing leads from the end of the article.
4. When necessary to spread an article to fill a given space, begin inserting extra leads by opening up between lines at the beginning of the article.
5. When full-length leads cannot be had and it is necessary to piece the leads, use a long and a short lead, alternating the short piece first on one end and then on the other.

Questions:

1. Why insert the extra leads above and below headings and display lines?
2. Why alternate the long and short pieces when using pieced leads?

Appendix B

Sample of Information Sheet

Plumbing Trade

Information Sheet No.-----

Solder

References:

(Your own up-to-date references should be listed.)

Information:

Solder used by plumbers is of two kinds: "regular" solder, and "wiping" solder. The first is used with the soldering iron and is composed of equal parts of lead and tin. It is often referred to as "half and half" solder.

Wiping solder usually is composed of about three parts lead and two parts tin and commonly referred to as "60-40" solder. The metals should be pure and clean. Lead melts at about 620 degrees and tin at about 445 degrees Fahrenheit. The mixture of the two metals, as in solder, melts at a temperature considerably below that required to melt either metal alone.

To test wiping solder, pour a small quantity on a brick. If the mixture is correct, it will have a mottled appearance. If it has too much tin, it will be bright.

To purify solder, heat until it shows a low red in a dark place and add a small lump of sulphur, stir well and skim off impurities. Solder should be stirred occasionally while being used.

Questions:

1. For what is solder used?
2. What metals can we solder?
3. What is the action which causes the solder to adhere or stick?
4. Why should wiping solder be stirred?
5. What conditions are necessary in order to have solder stick?
6. What precautions should we take in order to prevent impurities getting into the solder?
7. What are the common sources of impurities and how may you detect them?
8. Is it an advantage to have solder melt at a lower temperature than the other metals? Why?

Appendix C

Sample of Assignment Sheet

Arithmetic

To multiply numbers together where one or both of the numbers contain a decimal.

References:

(Your own up-to-date references should be listed.)

Problems:

- In the following examples, count the decimal places in the multiplier and multiplicand and see if the decimal point is properly placed in the product:

$\begin{array}{r} 60 \\ 8 \\ \hline .480 \end{array}$	$\begin{array}{r} .07 \\ 8 \\ \hline .56 \end{array}$	$\begin{array}{r} .0027 \\ 02 \\ \hline .00054 \end{array}$	$\begin{array}{r} 6.21 \\ 14 \\ \hline 2484 \\ 621 \\ \hline .8694 \end{array}$	$\begin{array}{r} 3.42 \\ 25 \\ \hline 1710 \\ 684 \\ \hline 8.550 \end{array}$
---	---	--	--	--

- Complete the multiplication in the following problems and place the decimal point in its proper place:

$\begin{array}{r} 3.65 \\ .24 \\ \hline \end{array}$	$\begin{array}{r} .124 \\ .003 \\ \hline \end{array}$	$\begin{array}{r} .004 \\ .002 \\ \hline \end{array}$	$\begin{array}{r} 68.4 \\ .26 \\ \hline \end{array}$	$\begin{array}{r} 1.21 \\ 5 \\ \hline \end{array}$
--	---	---	--	--

Check your work by adding these products. The sum of all the products should be 24.710380.

- If an apprentice receives \$1.19 an hour, how much will he receive per week if he works eight hours a day for five days?
- If one brick weighs 7.26 pounds, what will a load of 825 bricks weigh?
- The circumference of a circle is found by multiplying the diameter by 3.1416. What is the circumference of a pipe whose diameter is 6.5 inches?

Appendix D

Sample of Job Sheet

Electrical Unit
Appliance Wiring

How to Install a Feed-Through Switch for an Electrical Appliance

Information:

The feed-through switch is a handy device inserted in the attachment cord of electrical appliances for the purpose of controlling the current. It is used on heating devices such as electric toasters which do not have automatic thermostatic control. It is a simple on-off switch and is usually placed so it will rest on the table within easy reach of the operator.

Directions:

1. When location of switch has been determined, wind and tie a thread around the cord in two places, a distance apart equal to the length of the switch. This prevents the outer braid and asbestos from fraying after being cut.
2. Remove outer covering of cord and asbestos, if any, on the individual wires between the points where the thread is tied. Do not damage the wires or their rubber insulation.
3. Cut one wire midway between points where the thread is tied. Remove insulation about $\frac{3}{4}$ inch from ends of each free wire and twist the fine wires tightly. Be careful not to cut the fine wires.
4. Take the feed-through switch apart by removing the assembly screws. Connect the free wires to the binding posts in a clock-wise direction so that the terminal screws will draw the wires up tight. Fasten the halves of the switch together by placing the uncut wire in the groove and inserting the assembly screws.
5. Test by plugging cord into socket and attaching to appliance. The switch will control the current if properly installed.

References:

(Your own up-to-date references should be listed.)

Appendix E

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For specific instructional materials such as texts, analyses of various trades or other teaching materials, consult the *Trade and Industrial Teacher Trainer*, Engineering Extension, Iowa State College, Ames; and the *State Supervisor of Trade and Industrial Education*, Division of Vocational Education, State Department of Public Instruction, Des Moines.

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