



Fig. 9
Smelling

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 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 can't 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.



Fig. 10
Start with the foundation

In other ways, too, learning is like building. It takes place step by step, with new material fastened to what is already there. Each brick added to the wall must be fastened to the next brick with the right kind of mortar. The right kind of fastener must also be used whenever we learn anything. For example, if someone tells us how to handle the controls of a plane, we are not immediately competent for a solo flight, because the learning has not fastened adequately. Other and better fasteners are needed, such as Link trainers and training planes which give beginners a chance to learn by doing.

When we add a brick to the foundation wall, we use mortar on as many sides as possible. If it is fastened on only one side, the first push might tumble it off. With bricks attached firmly by the side, bottom, and ends, the wall will stand up under pressure for many years.

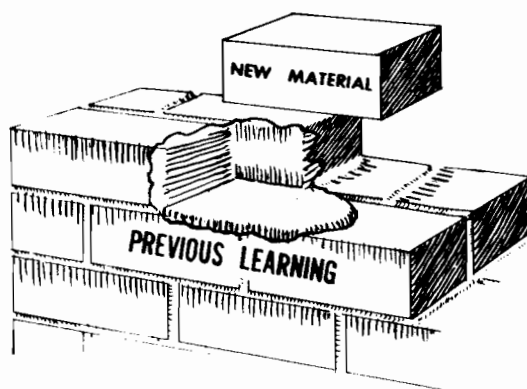


Fig. 11
Tie the new material to the old

So it is with learning. We should fasten every bit of learning with as many connections as possible. Seeing something provides one connection, hearing about it gives us another, and doing something with it gives us a third. These different ways of fastening the new impression to what we already know help us to learn more surely than if we got the new idea in only one way. The more connections we make, the longer we can remember what we learned.

II. HOW TO STRENGTHEN LEARNING

Getting many of the right kinds of clear impressions provides the framework of all learning. To make it really effective, however, this framework of learning needs to be supported and protected in many ways. Are your trainees interested in their work? Do they see how today's job fits with yesterday's or tomorrow's work? Do they have a chance to try out their new knowledge? Are they developing good work habits? Do they solve problems well? Are they characteristically good humored? An affirmative answer to these questions means that you are giving your trainees a good break, that their framework of learning is strengthened as it should be. Perhaps you would like to know more about these ways of improving learning.

A. THE LEARNER'S INTEREST IN HIS WORK

When Billy Mitchell enthusiastically tried to convince Americans of the importance of planes in modern warfare, his arguments fell on deaf ears. People were not interested in the preparation of equipment for a distant war. Within the last few years, however, almost everyone has taken an interest in airplanes. Youngsters build model planes, and millions of our young men and women now know as much about planes as about automobiles.

All of this new learning about planes has come about because we wanted to learn. The opening of new and good jobs and the excitement of flying are two of the many reasons for our interest. Because of them, we are now ready to learn, and we have what the psychologists call the proper mind-set for learning.

How can you use the interests of the trainees to help them learn? Just as a blacksmith heats his metal before forging it, you must warm up the interest of your trainees in what they are to learn. For this purpose, you can use any number of incentives. The trainees may want to get a better job, or they may want to please you or their boss. You may be able to rouse their curiosity about something new, or to link the necessary elementary information with advanced work which interests them. When they are completely warmed up and ready to learn, they have the proper mind-set for learning.

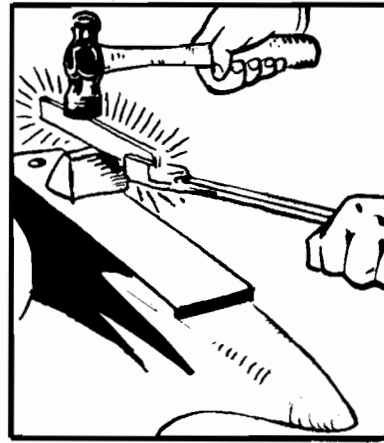


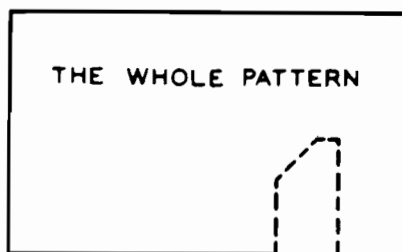
Fig. 12
Keep the iron hot

Sometimes they are all warmed up at the beginning of a class or shop lesson, and then their interest dies as the session goes on. If they are to continue to learn, somehow they must get warmed up again. Since most trainees have these ups and downs in interest, a good instructor learns how to keep them in good mental condition for learning by generating new interests as the learning progresses.

B. TODAY'S WORK JOB AND THE PATTERN OF THE WHOLE

For want of a nail the shoe was lost,
For want of a shoe the horse was lost,
For want of a horse the rider was lost,
For want of a rider the battle was lost,
For want of a battle the kingdom was lost --
And all for the want of a horse shoe nail!

If the blacksmith had understood why it was important for him to do a good job, the kingdom might have been saved. Your trainees, similarly, should accept the responsibility of doing good work if loss of life and equipment is to be avoided. If they are learning welding, they should understand how a poor weld can weaken the structure of a machine so that it might crack up under the stress of use. Moreover, they should understand how the welding of 'chromemoly' tubing, for example, is related to the welding of motor mounts in the finished plane. Anyone does better repair work if he understands how his job fits in with the rest of the repair jobs, and why it is done in one particular way. Learning is improved when trainees see where each specific bit of information or each specific operation fits into the whole pattern.



SPECIFIC
BIT OF
INFORMATION

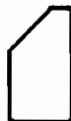


Fig. 13
The small part fits into
the whole pattern

Some persons who work on routine jobs which they do over and over may not be concerned with seeing how every detail of their work fits into the details of the other jobs. But for most trainees, knowing the relation between their job and the finished product is important. Even the maker of bolts is probably interested in knowing where those bolts are to be used. If you give your trainees some idea of this larger pattern into which their work fits, they are not only more interested -- they also work more intelligently. For they can then know which parts of their work are the most critical or important, and why certain operations must always be done in a certain way.

C. UNDERSTANDING WHAT WE LEARN

It is difficult to teach a child not to touch a hot stove because he does not really understand what it means to be burned. Once he understands, his learning of that particular fact is permanent.

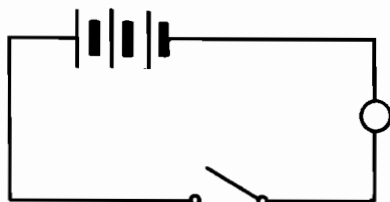


Fig. 14
Schematic drawing

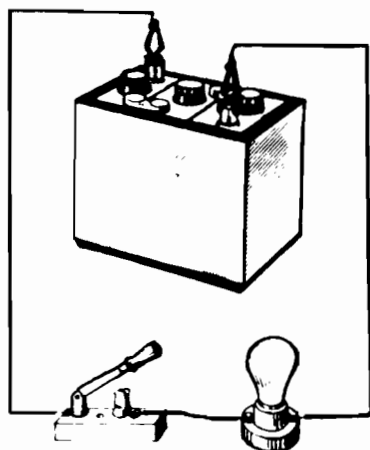


Fig. 15
Picture of the circuit

Grown-ups need to understand more complicated facts. If they do not, they, too, may get burned in one way or another. When a trainee simply memorizes principles, formulas, laws, and symbols, he may not know what they mean. Like a parrot, he repeats certain words which are useless because they are meaningless. The danger lies in the fact that the trainee often cannot use the memorized information in any situation which is different from the one which he learned. For example, a trainee might learn to write the symbols used in a schematic drawing of an electric circuit, showing a switch, a battery, and a lamp. See Fig. 14. But each of these symbols must mean something to him, if he is to understand how to use the drawing. See Fig. 15. Otherwise, he has not learned.

If the trainee understands the purpose or meaning of what he is doing, he can readily adapt his skill to new situations. For example, a trainee who understands the diagram of the electric circuit could substitute a receptacle for an electric fan in place of the lamp

bulb. Because he understands what he learned, he is not limited to the exact situation in which he first gained the skills or information.

D. LEARNING BY DOING

Have you ever heard someone say, "I've told him and told him, but he won't learn to do it right." Although the learner in such a situation appears stubborn, he may need more than telling if he is to do the job right. The best way to learn how to do something is to do it. Even simple jobs like hanging up clothes, or polishing shoes, are best learned by doing them at least once. The expert laundress and the shoeshine boy do their jobs over and over, and become more skillful than the average person who does the same simple jobs. The secret lies in doing the job they are learning.

Simple jobs for industry, too, are best learned if the trainees are given a chance to do them. Suppose someone who is being trained as a drill press operator has to know how to sharpen a drill. He can read in an instruction manual:

"For hard materials grind the drill point to an included angle of approximately 150° ; for heat treated steel a 125° angle is a good angle for drilling, and for a soft grade cast iron, the drill point should be ground to an included angle of 90° ."

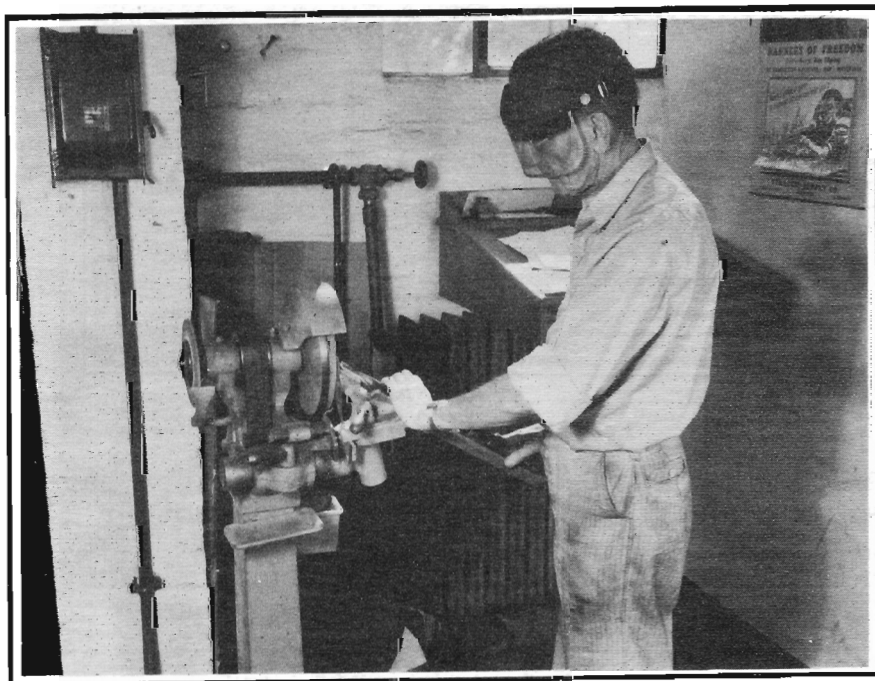
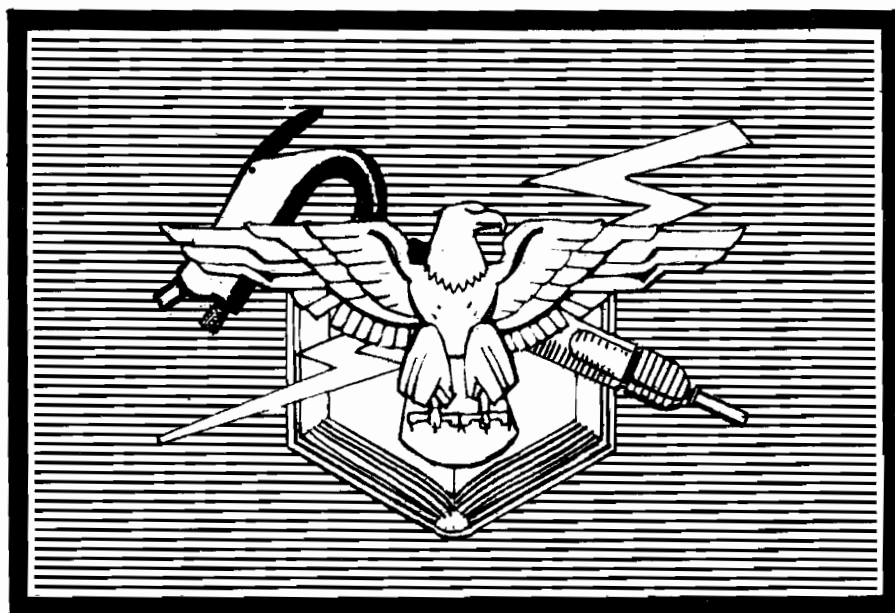


Fig. 16
Learning by doing

THE INSTRUCTOR AND HIS JOB



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