Learning—A Gateway to Progress

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It is a real pleasure to be here—and a real honor to have been asked to make the opening talk at this short course.

You could hardly have picked a more important topic for a meeting of production people. Oil lifting is not only the ultimate aim of a great deal of our work in the production end of the petroleum industry, but it is also a part of the business in which some of the most important improvements and changes are being made. In oil lifting, you have to keep running these days just to keep from losing ground.

Since we are all here for one main purpose, to learn, I'd like to peg my remarks this morning on the subject of learning—on learning, to be more specific, as a gateway to progress. And since we are meeting here on the campus of a great college, I take it that it will be perfectly in order to open our discussion with a literary quotation—one from that crotchety old playwright, the late George Benard Shaw.

For a vegetarian, Shaw often came up with some very meaty remarks. "Youth," he once said, "is a wonderful thing. What a shame it has to be wasted on children!"

Much the same thing, it seems to me, might once have been said of learning—at least of systematic and organized learning. What a shame it should have been largely restricted to the young. What a shame when, as all of us know, it is only after we have moved out on our own—from the schoolyard or the campus to the oil patch,say—that we realize how much there is to learn and how little we know.

Fortunately, however, there has been a growing awareness throughout our country that learning can be—and should be—a lifetime proposition. You can see this awareness in industry, and you can see it in the universities. In industry, training programs are flourishing as never before—training covering every pertinent subject from fast reading to slow driving, from the fundamentals of safety to the fundamentals of supervision. In the colleges, extension courses and short courses and night classes have thrown open the gates of knowledge to all who would enter.

The experience of two World Wars has undoubtedly had much to do with accelerating this movement. Industrial training, for example—learning on the industrial level—did not really come into its own until the first World War when, for the first time, America was called upon to convert herself into an "arsenal of democracy." The close tie-in between training and productivity was vividly spotlighted to the tune of "Over There," and it became evident to all that time spent in acquiring or sharpening a skill is an investment with an amazingly fast pay-out.

Even so, many of the lessons learned then were forgotten during the Twenties and Thirties. It took the shock of Pearl Harbor—the life-or-death need for hundreds of new ships and thousands of new planes—to arouse our flagging interest in industrial training programs. The results you know. From the farms and from the kitchens came a great throng of men and women who had never before handled a riveting machine or a welding torch. But they were willing to learn and they had the desire to learn, and in a period of weeks they became adept at skills that once had demanded months or years of apprenticeship.

This time we have kept the trend going. Instead of slacking off with the end of the war, learning projects have gained momentum. And the petroleum industry, I am proud to say, has been one of the leaders in this field.

In a way, perhaps, it was inevitable that our industry should take a leading role in adopting and promoting the cause of learning. It could hardly have done otherwise and still have lived up to its responsibilities. Over the past 30 years, America's demand for petroleum products has climbed nearly five percent a year on the average. This spiraling demand alone has presented a tremendous challenge to our industry—a challenge to shed new light on the dark underground, to learn more so we can produce more.

There was another fact of life that could not be ignored. When an industry is young, there is often a tendency for practice to move far out in front of theory, for cut-and-try methods to take precedence over techniques that are solidly based on scientific principles. Take transportation, for example. The wheel was put to widespread use centuries before the engineers of antiquity formulated and set down the mechanical laws that govern its functions. The same was true, in other fields, of such devices as the lever, the wedge, the screw, and the pulley.

That has also been the story, to get a little closer to home, in our own industry. The drilling rig was brought to a rather high level of development, and billions of barrels of oil were found and produced in this country, long before such terms as production practices and petroleum conservation and reservoir engineering became part of our vocabulary.

Slowly but surely, however, as an industry matures, its fund of knowledge builds up. New problems arise, and new ways of solving those problems are devised. "The old order changeth," as Tennyson said, "yielding place to new" and that has happened during the lifetime of the most of us here to the petroleum industry. Many of our exploration tools—the seismograph and the gravity meter, for instance—have been in use for less than 30 years. Some of our most common well completion and workover techniques, such as gun perforating and acidizing, are also comparatively recent developments. And new tools and new methods are still being introduced almost daily.

Because of these things—the challenge to our productivity and the expanding horizons of our technology —learning has become an indispensable adjunct of the petroleum industry. It has become a factor that can be slighted only at the risk of falling short of our great potential.

The short course we are inaugurating here today is a good example of the learning projects that have become so much a part of our industry. It is, in fact, a double-barreled example for it vividly exemplifies what industry and the universities can accomplish when they level their sights on a common target.

I have studied in some detail the program for these two days, and it strikes me as one that is packed with opportunities for learning — and for learning in matters that can benefit not only the companies we represent and not only ourselves but also, through increased productivity, the nation as a whole.

But you may have a question. Just what, specifically, can you hope to derive from a short course of this kind? What sort of learning?

In part answer to those questions, I might cite the case of a friend of mine who was trying to play a record for his young son on the boy's somewhat battered phonograph. He fiddled with the turntable and the controls for several minutes but was unable to make the machine work.

"I'm sorry," he told the youngster, "but this record-player is out of whack."

The boy wasn't fazed at all. "Well, come on, Dad," he shouted. "Let's go get some more whack!"

The petroleum industry—or any industry, for that matter—faces a similar situation. Things get out of whack. Sometimes economically out of whack, as during a flurry of runaway costs that may place one's company or one's industry at a competitive disadvantage. Sometimes technologically, as when one's company or industry lags behind in the race for more efficient tools and methods.

One example that occurs to me is of particular interest to all of us here today: the petroleum industry's "high cost of lifting."

In the last five years, there has been a sharp upward trend in the cost of lifting a barrel of oil—a jump of more than 70 percent in some instances. Monthly lifting costs per well have also climbed. Two factors have been largely responsible for these increases. One is the restriction of production to less than the maximum efficient rate, which is a matter relating to conservation and hence beyond our control. The other, however, is the general trend toward higher costs—a trend resulting from inflation and from more involved operations, and it is there that we can use a new supply of "whack."

Ours, of course, has always been a "whack" conscious nation. American ingenuity has long been one of our loudest and proudest brags, and rightly so. You may recall how the Hamill Brothers, drilling that first great well at Spindletop, herded some cows into soggy pit and used their churning feet to mix drilling mud. In different ways and different situations, that trait of oil field ingenuity has been put to good use hundreds of times since then.

But today, as I have already indicated, we must take into account one big change: Our problems are infinitely more complex than they have ever been in the past. We can no longer afford to rely on just the amount of "whack" with which nature has endowed us. We have to go out, whenever and wherever we can, and try to absorb an extra amount, which is exactly why we are here today.

The man with an inquiring mind will find that oil lifting offers him a fertile field to work. You need only thumb through the catalogs and trade journals of the last few years to see that great changes, some bordering on the revolutionary, are being made in production equipment and techniques.

You will be hearing about these developments in considerable detail in the sessions of this afternoon and tomorrow, but for the moment let's take a brief look at a few of them:

For one thing, wells are being drilled to greater and greater depths, and we are encountering higher and higher pressures. As a result, there has necessarily been a continuous improvement in both sufrace and subsurface production equipment.

You can see evidence of this trend in the newer varieties of casing and tubing and in their threads. Packers have also undergone some sweeping changes. From the simple shirt-tail and tool-set liner devices of yesteryear, packers have branched out in so many different directions that a Rip Van Winkle of the oil fields might take only a short nap and yet fall far behind in his knowledge of these important tools.

Improvements have also been made in equipment for well control and the handling of produced fluids. Many novel sealing devices have been incorporated into valves. Automatic controls have been applied to both flowing and pumping wells. Equipment is now available that can withstand surface pressures as high as 10,000 pounds per square inch, and emergency shut-off valves, either down in the well or at the surface, guard against the breakage of a flow line or damage to the wellhead itself.

Other developments aim at reducing the costs of well servicing. In some areas, self-propelled telescoping derricks and masts mounted with production hoists have made it unnecessary to install the more expensive production derricks. Air-actuated tools, such as slips, tubing tongs, and rod wrenches, have made servicing work at the surface both easier and safer. For subsurface work, there is now available an entire family of cost-cutting tools that can be run on a wire line: chokes, regulators, perforating guns, gas lift valves, and permanent type well completion equipment.

Artificial lift equipment has also made considerable progress in recent years:

Take gas lift. This venerable technique seemed on the way out after a curb was placed on the wide-open production of wells, but the introduction of valves that can operate with greatly reduced gas volumes and pressures caused a dramatic reversal of this trend. Also adding to the appeal of gas lift, and already mentioned, has been development of valves that can be wireline installed and serviced. Nowhere in the oil field equipment industry has competition been so keen as in the development and sale of gas lift equipment—and nowhere have such great improvements been made.

Sucker rod pumping, perhaps, remains the dominant method of artificial lift, but it has been hard pressed to extend itself economically to the full range of conditions that must be met. During the last 10 years or so, the unit pumper, which replaces individually set components, has come into almost universal use. The size of some of these units would have been considered impractical 20 years ago. As a matter of fact, the huge quantities of cast iron and steel required in surface and subsurface equipment to pump nominal amounts of oil present the greatest single challenge to designers, manufacturers, and users of production equipment.

One attempt to meet this challange has been the development of the long stroke hydraulic pumper. Up until now, this pumper has served to extend the depth at which sucker rods may be used, but at the cost of efficiency.

We have turned only a few pages in the catalog of production equipment. New tools and new methods—and new opportunities for learning—will spring into view as you flip over to other sections. Some involve the fight on corrosion, or the disposal of salt water, or secondary recovery operations. Others involve the handling of gas condensate wells, or the collection of reservoir data, and so on. But these things, many of them, you will tackle this afternoon and tomorrow. Suffice it to say that none of us is likely to run short of something to learn.

One other thing before we move along: The scope and complexity of the problems to be presented in this short course may raise a few qualms, particularly in those who have had little or no formal training in the subject under discussion. But I might remind you of an old saying about an engineering education: it should be sufficient to enable a graduate to hold a job for a few years until he can learn to be an engineer. Many of you here today—farm bosses and pumpers and gang-pushers—have been carrying out your duties for a great deal longer than just a few years. The long interplay of technology and experience has given you a solid grounding in many basic engineering principles.

I want to add, in passing, that the absence of a formal education need never become a bar to true learning. Some of the best educated men I know have spent very little time in a classroom. If one has an open mind, if he has the desire to learn, he need never feel fenced off from any field of learning. Most of the knowledge, for instance, that applies to the everyday operations of an oil field has been translated into a language any-

one with a desire to learn can understand. It is there for the digging.

Educational projects such as this short course can make this digging somewhat easier, but much can also be accomplished in your spare time on your own. Bruce Barton once discussed the influence of spare time on the history of our country. A rail-splitter named Lincoln started down the road to immortality by poring over his books beside a fireplace—in his spare time. A telegraph clerk named Edison began converting dreams into realities—in his spare time. An instructor in a small college, a man named Alexander Graham Bell, tinkered away and came up with the first telephone—in his spare time.

The rewards for your efforts can be exceedingly large in terms of increased productivity. The learning you acquire, the learning you apply, must inevitably add to our nation's productive resources. Your company will benefit from this—and so will you as an individual. For production is an essential ingredient of prosperity, an indispensable factor in our high standard of living. The more we produce, the more goods and services we turn out, the healthier can be our prosperity,, the higher our average standard of living.

The figures tell the story: America now accounts for more than half of the world's oil production. Besides that, we own or produce 48 percent of the electric power, 50 percent of the radios, 60 percent of the telephones, 65 percent of the steel, 78 percent of the automobiles, and 94 percent of the bathtubs. With productivity running at that level, is it any wonder that our standard of living dwarfs that of the rest of the world? Is it any wonder that the rewards enjoyed by the average American are unequaled in any other nation?

But those of you enrolled in this course—the farm bosses, the pumpers, and the gangpushers—have more than a material stake in extending the frontiers of your learning. And at stake is your feeling of pride in a job well done, the satisfaction that comes from accepting enlarged responsibilities and carrying them out to the best of your ability.

Take the pumper. In the early days of the petroleum industry, it was thought that any muleskinner who could twist a valve could work as a pumper. Nowadays we know better. The pumper has become one of the key men in the production of oil. To do a good job, he needs to know more these days than ever before—and that includes all the information he can get about the reservoir that has been entrusted to him. He is not just twirling knobs on the surface, which was once the casual idea. He is controlling one of nature's high pressure storehouses.

Is the most efficient use being made of reservoir energy? The pumper can often supply the clues that spell out the answer. Does a flowing well show signs of soon having to go on artificial lift? The pumper's observations— and an order placed in time—may prevent lost income while a well is down awaiting equipment. Are his reports accurate and complete? Decisions reached hundreds of miles away can be entirely in error if the pumper hasn't handled, and reported on his wells properly.

The pumper, in short, is in an excellent position to serve as an encyclopedia of information on individual wells. But only by growing with his job—only by keeping pace with the ever-advancing knowledge of oil-lifting methods— can he fully discharge his responsibilities to his company and to the royalty owners and, equally important, to himself.

Much the same thing applies to the gang-pusher. His work, both in well servicing and in miscellaneous lease work, also constitutes a key factor in the successful operation of an oil lease. He, too, must always expect to encounter a flow of new techniques, and these will always present to him a continuing challenge to his ability to grow.

As for the farm boss, his is a double responsibility —and the greatest, perhaps, of all. He must not only keep right on top of all the new methods and tools of oil lifting, but he must also take a leading part in training the men under his supervision. He must not only learn himself, but he must also help others to learn.

In closing, however, I would not have you feel that learning, however extensive, offers a magic key to success in this world. Each individual must apply his learning—apply it skillfully and diligently—to unlock the gates of progress. It is the contribution an individual makes, not what he knows, that will determine his place in society, and his value to it.

Our rule of life, perhaps must be a little like that of the founder of a successful school. He was asked how he had accomplished so much. "He just kept on praying," he said, "as if everything depended on God, and kept on working as if everything depended on me."

For the man who can learn, for the man who can accept and carry responsibility, for the man who can work as if everything depended on him, there need never be any dead ends. He can move as far as his abilities and his personal qualities will carry him—and that often means into the upper ranks of management.

But whatever his ultimate position, if he can live up to the letter and the spirit of his job his place will always be an honorable one—and he shall have done his part to keep open the gates of progress and to make this world a better place in which to live.