THE FUTURE IS...

"In case [your company was] too busy redeploying assets offshore to notice, U.S. companies in 1985 produced 88 million tons of steel and 13 million cars and trucks. They also turned out 67,000 tons of paper, 884,000 tons of coal, 131,000 pieces of farm machinery, 3.5 million metric tons of aluminum, and 25.5 million tons of fertilizer. Stick that up your service economy."~

According to the February 2, 1987, FORTUNE special report, The Economy of the 1990s, manufacturing will hold onto its 20% share of America's gross national product and do it with fewer people. Less than one-fifth of Americans now earn paychecks in manufacturing and the numbers are decreasing. But "[t]he Smokestacks Won't Tumble"; and the survivors of the 1990s restructuring "...should emerge as low-cost, quality-driven winners."

FORTUNE believes that the hordes of "...number-crunching minions and report-writing middle managers..." will disappear, and that "...perform many traditional management chores more cheaply than people...." The middle managers of tomorrow will be "...more concerned with exercising the craft they started with, be it sales, engineering, or accounting. As their numbers dwindle, middle managers will act more as coaches to the troops below and as coordinators who exchange information horizontally with other middle managers rather than relaying it between upper and lower ranks."

The line manager of a profit center will be a "value-added manager...." Said Mark Bieler, senior vice president of human resources at Bankers Trust, in an interview with FORTUNE. "Managing used to mean getting things done through others. Now it means getting value added, and that's a revolution."

What this vision of the future means to you as educators and consultants is that you'll be dealing with a unique audience in manufacturing line management. This audience's frame of reference is not going to match either your own or that of today's line manager. You're going to have to customize your approach to reach this diversified audience.

This paper will suggest some approaches for training that new type of manufacturing management in the use of the SAS* System. Topics are: 1) How is the manufacturing management audience unique?; 2) Why train manufacturing managers to use the SAS System?; and 3) How to structure the training to meet the unique needs of that audience.

MANUFACTURING MANAGEMENT

How are the managers of manufacturing operations different from others that you will train to use the SAS System? What are the keys to getting them to respond positively to your training? Let's consider a hypothetical first line supervisor of a bottling operation.

Our John Doe is a line supervisor responsible for the output of three production lines on one eight hour shift. These lines produce three sizes of the same consumer liquid ('SNUFF antacid). The twelve ounce line is set up to produce one hundred finished bottles a minute; the eight ounce line will produce two hundred bottles a minute; the four ounce line will produce three hundred bottles a minute. The bottles per minute figures are production standards. The lines are all running faster than their standards because some lost time or downtime inevitably will occur during the shift.

By the very nature of this operation, John's responsibility is to have his people and equipment produce 48,000 twelve ounce bottles, 96,000 eight ounce bottles, and 144,000 four ounce bottles of 'SNUFF' at the end of eight hours. In addition, he must produce this 'SNUFF without wasting components, which increases manufacturing cost. On top of that, the product must meet high quality
standards under the Good Manufacturing Practices of the Food and Drug Administration.

At the end of his eight hour shift, John needs immediate feedback on how his people performed -- how much value was added. This feedback will be rate (how many bottles per minute), yield (what percentage of the raw materials brought to the beginning of the line made it through to the other end), and downtime (how many minutes were lost because of planned or unexpected events which caused the line to stop).

What will be John's concerns at the beginning of his four hundred eighty minute shift? He begins by making sure he's got enough of everything -- including people -- to meet his production goals on each of his lines. Throughout his shift, he'll be monitoring the physical output of each of his lines. He needs to know, as his shift progresses, how he's doing so there will be no surprises at the end of the day. He'll be monitoring the time. He'll be monitoring his rates, his yields, and his uptime.

If he finds a problem, he'll be on the line with his people, finding a solution in the shortest possible time. John needs real-life results with measurable impact -- and he needs them now.

Who is John, by the way? What's he like? What does he need from you?

He'll probably fit in one of two categories: He's either an older manager who's come up through the ranks or he's a recent college graduate in an applied discipline (engineering, etc.) who's serving his company apprenticeship on his way to another job.

If he's an older manager, he will probably have had little exposure to computers. He may only be in your training class because his manager told him to be there.

If he's a recent college graduate, he'll probably be familiar with computers in general but have little idea of how to use these tools to help him in his present job.

In either case, what are the keys to getting him to use the SAS system? He needs to see the physical impact of using the SAS system. He needs to find out how to save time by using the SAS system. He needs to have hands on training in the use of base SAS software. He needs a trainer with lots of patience to get him to use the SAS system.

WHY THE SAS SYSTEM?

From our supervisor's point of view -- unless he was one of those told to show up for training -- there are several reasons to learn to use the SAS system. He may already be "hooked" on computer reports. They may even be SAS/GRAPE* or Proc Tabulate output. But his support group can't or won't do any more for him. And he's got information needs RIGHT NOW.

The diversity of SAS System output -- getting information in any format and the same information in multiple formats -- gives him different ways to look at his data. The availability of the SAS system in various computer environments is to his advantage. The consistency of coding statements means he has less to memorize. He can learn a little at a time and build on previous skills.

Even the manager who was told to report for training has a stake in the outcome. Obviously, there's a pretty good reason why he was chosen, even if that reason wasn't verbalized. If you, as a trainer, can't avoid teaching students who don't want to be there, you'll have to identify keys to turning these folks on to the SAS System.

USEFUL TRAINING APPROACHES

There are six approaches to training that will help to insure your success in teaching the SAS System to manufacturing management --
HANDS-ON

Whatever you do, have HANDS-ON training. These people are "doing" people. They need to use what they learn immediately and see the results of their efforts. At a minimum, you should have fifty percent practice time. You'll be using two very important learning principles -- reinforcement and feedback.

Educational reinforcement means using the concepts taught over and over again until they become second nature. It's why your sophomore Algebra teacher had you do twenty problems a night for ten weeks straight. The more you practiced "b = 20", the more you understood what "a" and "b" were all about -- that they were names for pairs of numbers whose difference was equal to twenty.

The same principle applies to teaching manufacturing managers to use SAS. SAS is as unfamiliar to them as Algebra was to you several years ago. They must practice the coding concepts over and over again to feel comfortable using them.

Educational feedback means letting your students know how they're doing -- the sooner the better. That's why your Algebra teacher had "pop quizzes" every other day and why you graded them in class after you took them. You knew right then what areas you were weak in, and which you had grasped. More importantly, so did your teacher. He could plan his instruction to review those concepts your class hadn't fully grasped.

Again, the same principle applies to teaching manufacturing managers to use SAS. By applying the SAS coding concepts you've explained before going on to new concepts, your students will gain confidence in their abilities with SAS.

KISS

KISS means "Keep It Simple, Stupid". Remember why you're teaching this class. The manufacturing managers you're training are not learning to be SAS System Analysts. They want to learn to be more effective manufacturing managers. They want to use the SAS System to add value to the job they do, not complicate it.

Limit the theory. Have lots of practice ("doing"). Stress the consistency of coding between Proc Statements. Teach very few statements. Expand on these statements or add more in a later training session. It's better for your students to learn a few SAS System statements well and be able to apply these statements to getting their jobs done than for them to have a "feeling" that the SAS System can help them do their jobs.

While the intricacies of a "do over" statement may fascinate you, they won't mean anything to a student who's never written SAS System code before. Sound teaching always starts simple and builds to the complex, so "Keep It Simple, Stupid."

AVOID JARGON

One of the biggest complaints about computer people is they don't speak
If you get two of them together, they start speaking in a strange, incomprehensible language. While we make perfect sense to each other, to the rest of the world we become very odd.

Avoid "DP-ese". Don't use a term without explaining it in easily understood, basic English. At best, you won't be understood and your students will tune out. At worst, you'll have provided a real good laugh for "the boys" and lost your credibility. A baud to you may be a unit of data transmitting/receiving speed, but to them its usually spelled b-a-w-d and has a "y" on the end!

A safe teaching assumption is that you need to explain every term once. You should provide a glossary of common data processing terminology. Preface each lecture portion of your training with a reminder for your students to ask for definitions of unfamiliar terms if they don't understand them. You can get feedback on terminology from your students by listening to how they use data processing terms in speaking. If they don't use the term when they could or use it incorrectly, they don't understand what it means.

Part of being at home in any environment is understanding the local language. Help your students become comfortable in the SAS System by learning the appropriate data processing terminology.

TIME COMMITMENT

Get a commitment for the students' time from their managers up front. If they leave for an hour, or even thirty minutes, you may have lost them for good as far as the SAS System is concerned. It's Jolley's corollary to Murphy's Law that they'll miss the most important point you'll make during the entire training.

Depending on the culture of your company, this may be the easiest part of your task. Many manufacturing plants make heavy commitments to training in both the hourly and supervisory ranks. These companies recognize the added value of training and will work with you to make sure your training is not interrupted.

Other companies only give lip service to training. You'll have a hard time retaining students throughout the course in these companies. In these circumstances, you may want to move your training off-site to physically remove the temptation to interrupt your training.

ON-SITE VS. OFF-SITE

Hardware and software availability will set some limits on where you do your training. Software constraints concern the availability of the versions of the SAS System. Be sure to consider the complexity of getting to the SAS System. How many extra commands are you willing to include in your curriculum to get to the SAS System running under TSO*, for example? If this is a first course, consider making it as simple as possible. Use the "cookbook", one step at a time, approach. Give your students a cheat sheet. Do anything, but don't get bogged down in esoteric topics that are irrelevant to the task at hand -- which is helping the managers do their jobs.

Do the training off-site, if at all possible. Some possibilities to investigate are local colleges and hotel conference centers. Unless your hands on sessions will be on personal computer versions of the SAS System, you may run into problems with computer access from a remote location. Plan ahead for the amenities, too. How are your students going to get to the training site? How are you going to handle lunch? Sometimes the advantages for off-site training are outweighed by the disadvantages.

If you train on-site, be aware that phone and "urgent" interruptions may be a problem. Try to keep your students as isolated as possible from normal work distractions. Part of the time commitment discussed earlier is for the company to act as if your students were on vacation for the duration of your class. If the company doesn't go bankrupt while its managers are at the beach for a week, it certainly isn't going "belly up" while they enhance their job skills for a few days.
REAL LIFE PROBLEMS

Have your manufacturing managers bring a "real life" problem to solve in class, preferably one that gives them real pain. This gives your training two advantages: 1) Your students will have a personal stake in the training -- solving their problem; and 2) They'll be able to see the benefits of using the SAS System immediately.

This real life problem becomes the basis for your hands-on sessions. Your students will apply the concepts taught in the classroom portion of training to the solution of their problem.

There are sound reasons for this "each one, bring one" approach. First, all learning consists of proceeding from the known to the unknown. Your students already know how to solve the problem the long way. They've been getting from the raw data to the solution manually. All you'll be doing is showing them how to use the SAS System to speed up the process.

Second, all learning should be relevant. By using the SAS System to solve one real problem, your students will see more opportunities for its use in their jobs.

TRY IT ONE TIME

Let's go through an example of how all these approaches might be incorporated, even when not in the best of all possible situations.

You've got an Introduction to the SAS System class of eight first line supervisors set up. These students have seen SAS/GRAPH output before and some even have SAS systems running that were written for them by someone else. They are a mixed bag as far as computer literacy is concerned. Half can use a spreadsheet program on a personal computer. Of the other half, two have used a terminal to access mainframe COBOL systems and two have never touched a keyboard. At least one of these supervisors has no desire to learn anything about computers.

The training will be offered on-site because of hardware constraints. On top of that, you don't have sufficient hardware available in the training room; it's spread out all over the plant.

How are you going to get a viable training class out of this?

First, send all of the students a memo about a week before the class asking them to bring a problem with them to class. This must be a task that they resent doing, that adds, subtracts, multiplies, or divides numbers, and that they do on a relatively frequent basis (weekly or monthly). Ask them to think through how they accomplish this task now.

The training itself is scheduled for five consecutive days, eight hours a day. The managers of these supervisors have agreed to act as if these people were on vacation in Outer Mongolia for the duration of this week. Other than barricading the doors, this is the best you can do to minimize the demands on your students during the training.

Because of those hardware problems we've mentioned, you'll have to divide your training into ten half day sessions. The first half of each day will be devoted to a classroom structure, complete with visuals and specially prepared handouts. The second half of each day will be devoted to hands-on practice of what was covered in the morning as applied to the problem the supervisors have to solve.

During training, you'll cover a very simple Data Step with visuals, such as overhead transparencies. This Data Step will do little more than read in raw data and create a variable or two. Cover Proc Sort, Proc Print, and Proc Means. Emphasize the Set, By, Var, and Output Out- Statements and the consistency of their use between Proc Statements.

Each student should have a copy of
all the overhead transparencies you'll use. They can take their notes right on the copies, if they want. Included in their handouts are step-by-step "cookbook" instructions for accessing the SAS System.

For the workshop portion of the class, assign two students to each terminal. This effectively "doubles" the brain power being brought to bear on each problem task. It spurs discussion and debate. It reinforces the learning experience. It also comforts students to know they're not alone in dealing with new situations.

Because of their varying computer literacy, you do the assigning beforehand. Those who seem most comfortable with computers will be assigned to work with those who are least comfortable. Walk around to advise and confirm their progress. If your students are really lost, give them hints, help them with coding. But, remember, the object of the hands-on portion of your training is to reinforce the learning of the morning material. The students will learn best by doing the coding themselves.

At the end of the week, each student will share their problem and solution (or lack thereof) with the class. This will help them recognize that there are many different problems that can be solved using the SAS System. The problem that one student solved may be one that's stumped another. With a little help from you, the students can become their own support system.

CONCLUSION

How well does this approach work? Of the manufacturing managers I've taught using these training approaches, ninety-five percent thought the training was valuable and worthwhile. More importantly, approximately seventy-five percent went on to write "programs" using the SAS System and use them on a regular basis.

The SAS System can become an important element in helping manufacturing management add value to the company and its products. By learning a few simple statements and being able to use them comfortably, your students can automate vital portions of their jobs which are mundane and time consuming. They can spend more time coaching their people and coordinating with other managers.

The keys to effective manufacturing management training in the SAS System are 1) understanding why the manufacturing management audience is unique, 2) knowing why they want to use the SAS System, and 3) structuring the training to meet their unique situation.

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