TRAINING INDUSTRIAL PROGRAMERS

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The process of training programers at the Center for Programmed Learning for Business has been undergoing constant change since we began in 1962. The change has resulted from two forces—increased knowledge of the technology and the changing role of the programer.

The specific technical advances applied to Michigan workshops have been presented elsewhere.[1] What we will discuss here are changes in the objectives of our workshop in response to what we have learned about the needs of our "customers" (90 percent of the participants in the workshops have been representatives of the business community — industry, commerce, and government). These changes are essentially changes in emphasis given to various aspects of the programing process; topics have not been dropped to be replaced by other topics of current interest. For example, a workshop three years ago devoted a great deal of time to the branching-linear decision. Today, growing awareness of the issues involved in decisions such as this one permits us to attack it much more systematically and discuss it much more concisely than before. It also enables us to accomplish more and more in five and one-half days, the length of each workshop since the beginning.

Although the changes have evolved continuously over the past three years, there have been four distinct phases:

Phase 1, *Training people to write frames.* In 1962, being a programer meant writing many good frames on almost any topic presented to you. We[2] perceived our job as programer trainers as primarily teaching participants to write effective frames, and our job as editors to critique these frames. During this phase, our instruction dealt in detail with frame writing techniques (e.g., formal prompts *vs.* thematic prompts) in considerable detail. At the present time, topics such as these are dealt with in an hour-long discussion titled "History and Jargon." However, no sooner had we started along this line than we began to see indications from a number of sources[3] that the best, most technologically sound sequence on the wrong topic was disastrous.

Phase 2. *Increased emphasis on task analysis.* The problem now became one of teaching the programer to do a task or subject matter analysis, and *then* to write frames *if* a program was needed. We found ourselves as editors asking questions such as "Why *should* a person do that particular task?" "Is it a matter of his not *knowing* how, or not *doing* the task?" "Do you want the trainee to be able to talk about it or do it?" Needless to say, these questions come as a shock to the potential programer who came to learn to write frames and not be asked such a collection of seemingly irrelevant questions.

The problem has been largely solved through programing a major part of analysis — that is, internalizing the "why" questions so that the potential programer asks these questions of himself. The programing includes two forms developed by Dale Brethower (Figures 1 and 2) which guide the programers' thinking about the problem at hand.

In summary, our task became one of getting each programer to ask and answer these questions: (1) Is it a training problem? and (2) Is it economical to program it? Once this task had been accomplished, it became evident that we faced another problem — management and administration of the programing activity.

Phase 3. *Preparation for management of the programing function.* It became apparent that many programing efforts fail for nontechnical reasons. Comments at a typical Advanced Workshop (a three-day problem solving session with experienced programers) include these:

1. "I've got the boss sold on programed instruction, but now he wants me to figure out how to sell the Old Man."
2. "I think I know how to judge programs when I can see the finished products, but how do you evaluate contract proposals? What kind of information should I demand in a proposal from a prospective contractor? How do I decide which firm I should do business with?"
3. "I'm heading up a project to program information for our salesmen on our new JZ 88 model. But we can't get to the right guys as subject matter experts. They keep referring us to some clown who only gets his knowledge from trying to interpret somebody else's drawings. And, we've only been able to talk to him for a couple of hours."

This kind of feedback told us that our industrial programer might be called upon to fulfill any of several roles: educator of top management on the potential of programed instruction, negotiator of a contract with a programing firm, evaluater of off-the-shelf programs, or director of an in-plant programing effort. Our approach to this problem has been to devise several exercises which, combined with the writing that participants are assigned, prepare them somewhat for the problem of managing the programing effort. They are required to evaluate an off-the-shelf program, select a programing firm from a package of proposals, and respond to various memoranda concerning programing management. The combination of analysis, frame writing, and management exercises is illustrated in Figure 3.

Once again, however, we see another problem. This has to do with efficiency of instruction.

Phase 4. *Attempts to teach program design.* Program design has two elements:

1. *Situational Constraints*

   A program must function successfully within a "real-world" environment. Once again, a technically flawless program may fail if its designers disregard or overlook forces that will affect its success. For example, a program often becomes part of an existing training activity. How the

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program meshes with existing training will in large part determine that program's effectiveness. Similarly, time available for programed training must be considered by the programer. The content, format, and sequencing of material evolves "naturally" once the programer determines how and when his program will be incorporated in a projected training course.

2. *Simulation of actual job conditions*

The two chief factors involved here are *materials* and *sequencing*. Appropriate selection of material is exemplified in the *Effective Listening* program (developed and published by Basic Systems, Inc.), which utilizes tape recordings of spoken passages. In determining sequence of major sections within a program we have evolved a general rule: Let the sequence follow the *decision process* involved in the task. This was illustrated during a problem-solving discussion at a recent workshop. The problem presented was "familiarize claims analyst trainees with uniform standard provisions common to all health insurance policies." The person who presented this problem had tentatively decided to program these provisions in the sequence in which they appeared on the policies. Analysis centered around the question "Why does the claims analyst have to be familiar with his information? What does he use it for?" The pattern of decision making which this analysis produced is diagramed in Figure 4. The same sequence was then followed for the major sections of the program.

Figure 1.

NAME: **John Trask**

ORGANIZATION: **George Distributing Co., Inc.**

WHAT IS THE PROBLEM AREA?

Getting route men to service accounts and to sell better.

WHO WILL BE THE STUDENTS?

3,000 route men with 2 months' to 10 years' experience. Also about 800 new route men each year. Most are high school graduates between 21 and 35 years.

WHAT ARE THE STUDENTS OR PRESENT PERSONNEL DOING THAT IS INCORRECT?	WHAT SHOULD THEY BE DOING IN EACH OF THOSE SITUATIONS?
1. Placing new deliveries on top of or in front of old stock. Leaving stock that is too old rather than returning it to the warehouse.	1. Rotate the stock so that none of it needs to be returned to the warehouse.
2. Not helping retailer with his display.	2. Helping retailer so that display is more attractive than those of competing products.
3. Failing to expand their route by selling to "new" retailers.	3. Most route men should open 5-10 new accounts.

WHAT IS THE VALUE TO THE ORGANIZATION OF PRESENT PERSONNEL AND/OR STUDENTS PERFORMING CORRECTLY IN THE ABOVE SITUATIONS?

It would increase sales and decrease losses due to spoilage.

STATE QUANTITATIVELY THE VALUE TO THE ORGANIZATION:

(You write it)

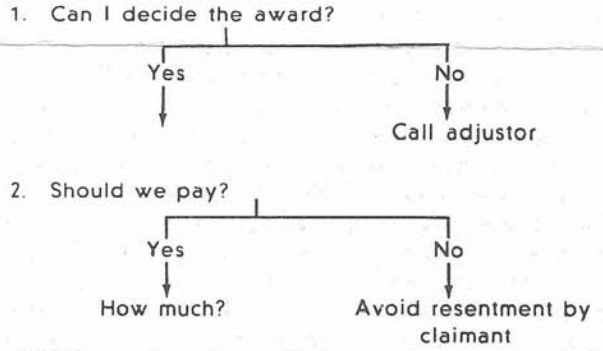
WHAT TEST SITUATIONS OR TEST QUESTIONS COULD YOU USE TO DETERMINE WHETHER PRESENT PERSONNEL KNOW OR WHETHER STUDENTS HAVE LEARNED WHAT THEY SHOULD DO IN THE EXAMPLES ABOVE?

1. Show picture of old stock and material to be delivered. Ask where new material should be placed.
2. Show pictures of display. Ask what they would say to retailer about changing it.
3. **(You write it)**

(From: **Programmed Learning: A Practicum,** Brethower, Markle, Rummler, Schrader, Smith. Ann Arbor Publishers, Ann Arbor, Mich., 1965.)

Figure 4.

Decision Sequence for Claims Analyst



While we have been able to acquire program design skills, we find that teaching these skills to our students represents a formidable task. It is this task which we presently face, and we shall be devoting considerable attention to it in future workshops. Continued feedback from our students who return to their jobs will, as always, facilitate this process for us.

Summary

Perhaps we have adopted a broader interpretation of "programing" than most. However, we argue that it is a most realistic definition. The programer who sits in a room and has the subject matter slipped to him under the door, and who passes on frames the same way, is a rare bird indeed.

The evolution of "phases" described herein might also be viewed as a series of steps toward a *systems approach*[4] to the industrial programer's job, although we didn't recognize it as that until the last year. Because we are fortunate enough to have continual feedback from our alumni and a flexible, mature staff, we have been able to con-

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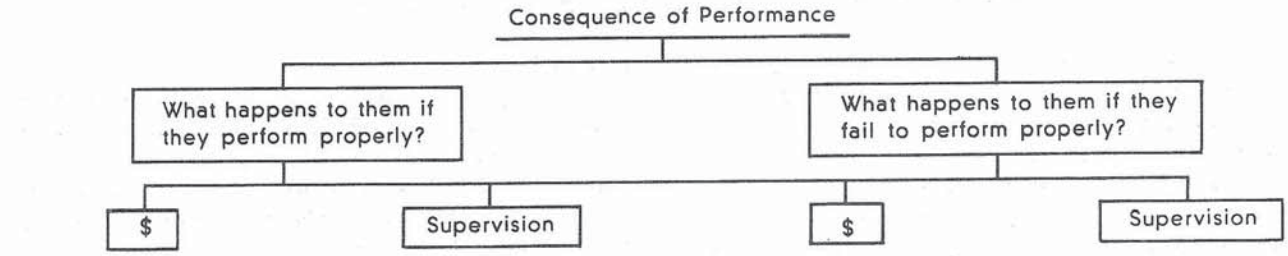
Figure 2: Subject Matter Analysis Performance Form

Problem: Route men know how and when to rotate stock, but do not rotate it properly



Unaffected by spoilage rates. Salary consists of a base rate supplemented by a commission on sales.

Always criticized when they return spoiled merchandise.

Occasionally discharged, but only in extreme cases.

Occasionally company inspector finds spoiled products at retailers'. Route man is criticized but often legitimately argues that it was there when he took over the route.

Select the conclusions which more accurately describe the above conditions.

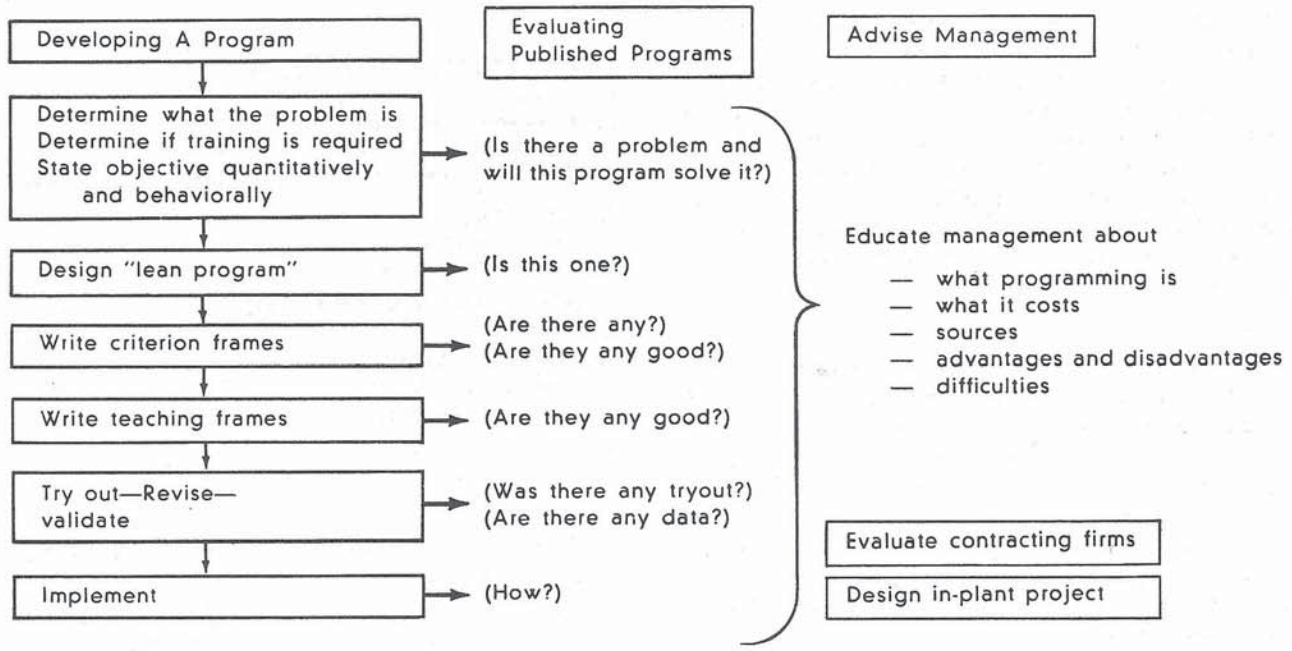
Salary administration

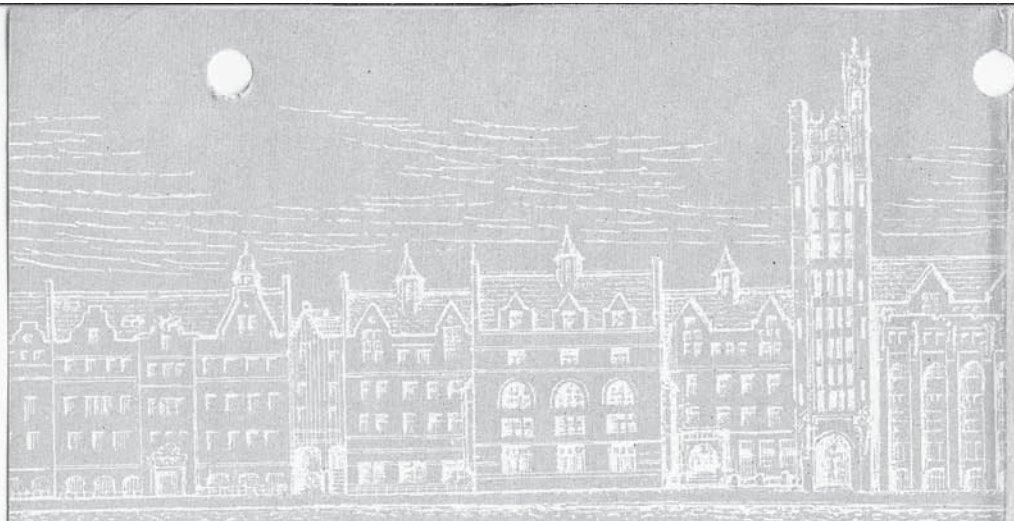
- Provides adequate incentive for rotating stock.
- Provides little, if any, incentive for rotating stock.

Supervisory practices

- Provide little or no incentive for rotating stock since men can avoid criticism by not returning spoiled stock to the warehouse.
- Provide adequate incentive for rotating stock since, when men return spoiled stock to warehouse, they are criticized for allowing it to spoil.

Figure 3: Preparation and Management of the Programing Function





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Programed Instruction

A MONTHLY BULLETIN OF BEHAVIORAL TECHNOLOGY IN EDUCATION

OCTOBER 1965 Vol. V, No. 1

TRAINING INSTRUCTIONAL PROGRAMERS

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