

Progressive Skill Training

An After-Hours Program to Keep Pace with Technological Change

P. J. Chartrand

Any training program should be based on the specific needs. So, before describing our off-hour programs, I will briefly cover our operation. The objectives of the program and the problems we had meeting the objectives will then be more meaningful.

The Peterborough plant of Canadian General Electric employs approximately 5,000 people. Our products vary from $\frac{1}{4}$ H.P. motors (each worth approximately \$10.00, produced on a continuous mass production line) to large electrical motors and turbine generators (worth approximately \$1,000,000.00 each and made on a job shop or custom basis). Most of our products demand a high level of manual skill.

Although we deal with complex products and processes and have a large number of professionally-trained people, some of our long-service people have limited academic background. They were hired in an era when people were taught "how to do" a job; today these "how-to-do" jobs are disappearing. Many of the remaining jobs emphasize "why you do it." These people have to adjust to new skills which usually involve more academic background and a longer training period.

For manufacturing, we require certain skills which traditionally have come from two sources:

1. *Our Apprentices Program*

We currently have 112 apprentices learning 17 types of skills. How-

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The program described in this article won the Ontario Society of Training Directors Award for 1965.

ever, over the years, 85% of our graduate apprentices in some crafts have been upgraded to salaried jobs, leaving only a small portion to do skilled work.

2. *By Recruiting European Craftsmen*
Today, European craftsmen are not available.

A Case History

The program we call Progressive Skill Training is a new concept to us. Basically it provides an opportunity for our present employees to upgrade their knowledge and skills. They learn these skills *in stages, off-hours, and primarily in the plant*. The employee provides *the time*, the Company pro-

vides *qualified instructors, the facilities, the course content and most of the materials*. Here is a case history on how it works:

Jerry has been with the Company since 1947. He has eight years of schooling. During his employment with us, he has spent 14 years as a punch press or cut-off saw operator. These are unskilled jobs—we can train a new employee who is willing and able to do them in three to four weeks.

Theoretically at least then, in his 15 years, working with the Company, he had four weeks skill experience 195 times.

Starting in the fall of 1962 Jerry took these courses:

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| 1. Blueprint Reading 1 | — | Blueprint Reading—Shop Math Section 1—10 weeks course. |
| 2. Blueprint Reading 2 | — | Blueprint Reading—Shop Math Section 2—10 weeks course. |
| 3. Arc Welding | — | 10 weeks course—Leading to a Government "Flat" Ticket. |
| Experience 1 | — | While taking these courses, Jerry was working as a cut-off saw operator.
He now applied for and was accepted as a 3rd Class Fitter Welder. |
| 4. Arc Welding | — | 10 weeks course—Leading to a Government "Vertical" and "Overhead" Ticket. |
| Experience 2 | — | With these new qualifications Jerry has become eligible as a 2nd Class Fitter Welder, and, in fact, has since been promoted to this level. |
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Normally it takes us four to five years to develop a Fitter Welder, so Jerry has a way to go before he becomes a First Class man. By his own efforts, however, Jerry has progressed and should he leave the Company, he has a new skill to sell.

Development of the Concept

Our first "attempt" at developing this program was in the fall of 1962.

A two-part Blueprint Reading Course was developed. The first part was Basic Blueprint Reading; it involved some basic Math. The second part was Advanced Blueprint Reading.

The course was advertised within the plant; 190 applications were received. Applicants ranging in age from 16 to 55 with from grade 6 public school to 3 years post high school, institute of technology. One hundred and

forty-eight people were accepted and grouped into the Basic or Advanced parts based on four factors:

1. The extent to which they used Blueprints.
2. Their academic background.
3. The time they had been out of school.
4. What they felt their needs were.

Each section was a 10-week course. Three senior draftsmen were chosen as instructors; two of them had taught High School Drafting as fill-in teachers. In six weeks, the original group of 148 was down to 90. Fifty-eight people had dropped out. We recognized we had a serious problem. Our plans for future programs were at stake. The law of effect was going to rear its ugly head—people tend to repeat actions they have success at and conversely avoid actions they don't have success at.

A number of meetings were held with the three instructors, the participants' supervisors, and a psychologist in the community. We came up with this approach:

First: We would survey the participants, both in writing and personally, to see what suggestions they had.

Based on this approach, we found the following:

1. The course was too short. People just don't remember math unless they have been using it.
2. There was a serious problem in categorizing applicants.

The entrance criteria, if you want to use the term, were difficult to establish. In my view, one of the greatest problems we face in any form of adult education today is the entrance criteria. What do the students currently know? Where should the course start?

Second: To group the applicants better, it was decided to use a small battery of tests. They were:

1. A Shop Math Test.

2. Part III of the Psychological Corporation's General Clerical Test.
3. A Blueprint Reading Test we developed for this purpose.

We then took steps to correlate the tests with the results on the course to see if they had predictive value. The psychologist did this validation. The findings were promising (correlation of $+0.55$ and $+0.76$), and they provided means of:

- a. Predicting success between Sections.
- b. Predicting success within Sections.

We concluded:

1. Two of the tests had promise, but further systematic work should be carried on to "prove" them out.
2. The Shop Arithmetic test, in general, seemed to measure the same things as what the clerical test did and was therefore deleted from the selection battery.

As the result of our findings the Course has now been changed from a two-section to a three-section Course. Emphasis in all three sections is on mathematics. These tests are now administered on the first night. The assignment of people to one of the three sections is primarily based on the tests.

Let us compare what effect these changes have had:

	<i>Participants Started</i>	<i>Participants Finished</i>
1st Course	148	83
2nd Course	116	101

In the first Course, 53% of those accepted completed their Section. In the second Course, this figure rose to 87%.

Through this Blueprint Reading Course our people have an opportunity to up-grade their Math to approxi-

mately grade 11 (average participant to-date has 8.3 years of academic education) and to become knowledgeable of our engineering drawings and procedures. The course has become a prerequisite for those who wish to go on and learn a related skill.

Arc Welding—Pilot Group

The second phase of the program, started in the spring of 1963, was to develop an off-hour Arc Welding Course. The Manager of Shop Operations was one of the main forces behind getting the course organized. His operations had been spending their training dollars on new employees. As soon as there was a downward swing in business, they lost the people trained, through layoffs.

The purpose of Pilot Group was to:

1. To find how much we could teach and at what cost. We "hoped" the participants would satisfactorily pass the Government's test for "flat" welding. This is the lowest of the three categories, flat, vertical and overhead, we most commonly use.
2. To find if it was practical to make

- this type of course available for:
- a. Successful Blueprint graduates.
 - b. Those who have mechanical problem solving ability.
 - c. Those recommended for such work by their supervisors.
 - d. Employees who have an interest in becoming Fitter-Welders.
3. The long-term objective would be to train our people with service, rather than the new hires.

The course involves 80 hours of practical and theoretical classes. The 60 hours practical instruction was given by our Quality Control Welding Inspector. The remaining 20 hours of theoretical instruction was given by our Plant Welding Engineer. He assigned and fed back the home reading and written assignments. The class met ten hours each week; three hours on Tuesdays and Thursdays, and four hours on Saturday mornings.

960 Man Hours Later

While running the Pilot Course, we were fortunate in having a course run "on-hours." We were thus able to compare the results of both courses.

	<i>Off Hour</i>	<i>On Hour</i>
Average Registration	6.5	5.5
Total Cost	\$549.85	\$3,160.00
Cost Relation	1	6.8
Per Employee	\$ 84.60	\$ 575.00
No. of Hours	80	80-120
Attained	1 flat and 5 vertical	5 vertical

From running this and other Arc Welding courses we have concluded the following:

1. We had hoped to get the trainees to the "flat" level. Instead, five

of the six surpassed this and obtained the "vertical" level.

2. The incubation period is very good. People in an eight-hour-day training situation tend to hit

- plateaus—they become saturated. In our view, this does not happen to the same degree on off-hour skill courses.
3. It would be feasible (although subsequent courses were enriched, increasing costs) to train people in new skills while they were working on their old ones. Consequently, employees with established service while on their present job, if they wished to avail themselves of the opportunity, could be trained for future upgradings.
 4. Although in all our programs we avoid making any promises, in business down-trends you have a better chance of retaining the people with skills. Having considerable service (the average is 12.5 years for the Arc Welding Course) they should be able to bump back to their original jobs in a moderate cut-back. From a manufacturing point of view, you can maintain your inventory of skills and can accept business more readily on the upturn.
 5. Interest and determination is high. The people attending have come with the intention of learning. The essential ingredient to learning, motivation, is very much present.

Machine Cutting—Program IV

The next development of the Progressive Skill Training concept took place in 1964 and is known to the Ontario Department of Education and the Federal Department of Labour as the Peterborough Industrial Education

Program. We call it Machine Cutting I and II.

- a. *Entrance Criteria.* Employees who have taken the Blueprint Reading and Shop Math Course or its equivalent.
- b. *The Course Background.* A two-part course built around the machine knowledge and ability to set up and operate a turret lathe (Part I) and leading to the knowledge and ability to set up and operate a vertical boring mill (Part II).
- c. *Development of the Course of Study.* This summer we hired a Machine Shop Instructor from Crestwood Secondary School, to develop the course outline and preliminary lesson plan for the above courses. This has now been accomplished:
 1. Eight Month, 66 session, Part I Pilot Group started Sept. 15, 1964. It includes 10 employees, meeting Tuesdays and Thursdays for a total of six hours per week. They use the Collegiate Machine Shop, our conference rooms, and our machine facilities.
 2. On August 14, 1964, a Shop Director from Adam Scott Collegiate and Vocational School and the other Shop Instructor reviewed the content of the Part I Course. From 144 hours of classes designed essentially to teach machining theory and practice, they found, most of the material covered actually fell into traditional academic subjects.

English - 44 hours
(written and oral communication)

Science - 33 hours
(Laws of heat, elasticity, etc.)

Mathematics - 24 hours
(Feeds and Speeds)

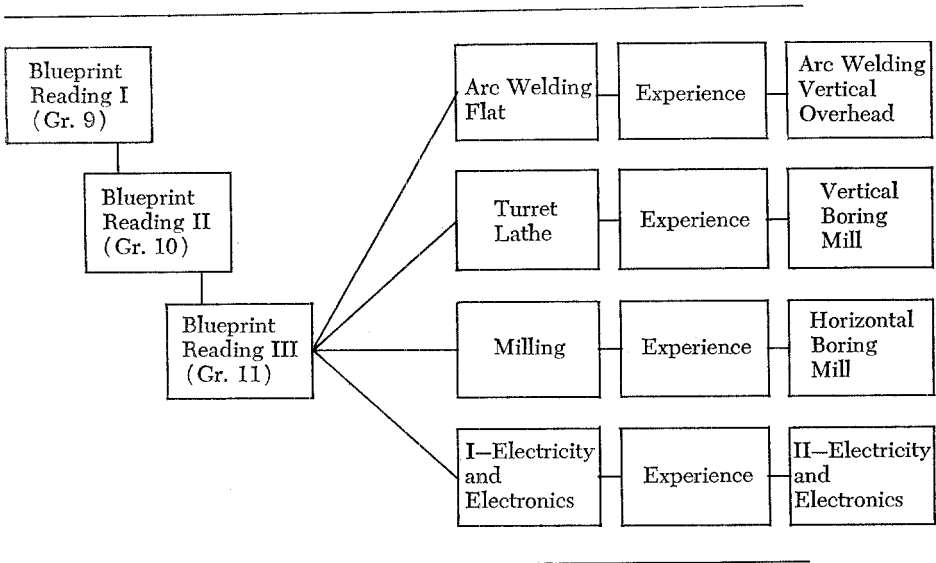
Skill - 43 hours

The Government is paying for the academic or theoretical portion of the course. We are paying for the skill portion. We believe this presents an excellent learning opportunity, the academic or theoretical portion being reinforced by the skill portion.

Under Program IV the cost of the instructor, the material and a portion

of the supervision and administration of the course are covered.

In the Summer of 1965 we developed a Milling Machine Course. In the Summer of 1966 we plan to develop an Electronics Course. In effect our progressive skill training program will then have the following paths in place:



What the Program Offers

Through the Progressive Skill Training approach the following is being attained:

1. We have a way by which our long-service employees can upgrade their theoretical background and increase their saleable skills.
2. We have been shown that in our situation our people learn as well, if not better, off hours as compared to on hours.
3. From a manufacturing point of view, we have an important source of skills and development.
4. We are now gaining experience in working with Government

agencies. Although Government participation may well become more and more a way of life in training people in Industry, we would like the opportunity of moving into this area gradually. It is appreciated that Government participation is regarded by many management people as undesirable. In my view, however, Industry has too often trained people the way an amateur plays the Stock Market. The amateur invests, usually, when the market is close to its peak. When the market is at its low point, the amateur frequently sells. This is the time the professional is buying. If Government support will

mean that when we are at a low business level, we can train people in skills which can be used in a business recovery phase, such support will enable us to make an investment in Canada's human resources, at a time when most Industries are traditionally doing very little.

5. We have over 600 people taking off-hour courses this year. They range from the type of skill courses referred to—to Business Administrative skills, such as Business Fundamentals, Communications, etc.

There are 18 part-time Instructors; essentially they are line people. With the help of our Train-

ing Specialist with the Industrial Products Department of the Canadian General Electric, and the Peterborough Board of Education, an Instructors' Seminar has been developed. Such a seminar is an important part of this program.

By using established learning principles, where possible, and applying current knowledge (particularly line Management's and frequently hourly Rated employee's) in a systematic fashion, documenting objectives, then—measuring the results—we have been able to make some inroads in a problem common to a number of industrial workers and companies facing continuous change as a way of life.

Letter to the Editor

It was good to see the article on "Japanese Industrial Training" which appeared in the December 1965 issue. A good training director must certainly look beyond our own shores and any material on training in other countries is all to the good.

The problem that sometimes arises is that some of the cultural and social elements of the other country can be missed or glossed over. On page 6 of the article, the authors note that "Pirating of skill workers does not occur in Japan, nor are there layoffs because of business decline. The company merely reduces expenses as best it can and maintains its *full* (emphasis mine) staff as long as possible . . ." The clue is, of course, what is "full staff?" It is important to probe this issue, else the ability of the Japanese business man to avoid manpower cutbacks becomes almost mystical.

The answer is, of course, in the area of the "temporary employee." I've discussed this aspect of Japanese labor in my small book "Employee Training in Japan" (Education and Training Consultants, Los Angeles, 1965). In the limited space of this letter, all that can be said is that this is a category of worker to which there is no obligation in the Japanese paternalistic system. This can seriously alter the conclusion drawn by the writers in the quoted paragraph.

The remainder of the article is of interest and gives specific examples of training in one company in Japan which, based on my own experience, appears to be very typical of one of the better training programs.

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