Training Within Industry:
Fundamental Skills in Today's Workplace

Donald A. Dinero
The TWI Learning Partnership
Rochester, NY 14612 USA

ABSTRACT

The Training Within Industry (TWI) Programs have been called "the most underrated achievement of 20th Century industry," [1] underrated because most Americans do not know about them and an achievement because they helped America and its allies win World War II. In addition, however, they involve fundamental skills that every person should master and use on a daily basis. As such, they are necessary for all members of any organization to use in order to be as successful as they can be.

This paper discusses why these programs, developed almost seventy years ago, are still not only relevant but also necessary in today's workplace. Not only have ideas about organizations' cultures changed over time, but management's focus on culture has changed. Today these programs produce the classically required results of improved quality, cost, safety, and productivity as they did when they were developed. In addition, however, they substantially improve morale, teamwork, and communication, which are also of great concern in today's workplace. Moreover, they do this without coercion by building an intrinsic motivation in employees. This is done by getting employees more engaged in their work. The present paper also discusses how the programs should be used to accomplish the aforementioned objectives. Specific points are itemized to address the successful implementation and sustainment of the programs in the organization's culture.

Keywords: Training, Productivity, Quality, Methods, Relations, Job, Lean, TWI Implementation

INTRODUCTION

The Training Within Industry (TWI) Service was created as part of the War Manpower Commission in the United States in 1940 in order to help defense contractors become more productive. The United States was not involved in World War II at that time, but government officials knew that, at the least, it must supply war material to its allies who were engaged. This mission was critical because the USA was just emerging from The Great Depression and it was in no condition to supply the amount of armaments needed for a large war. After some false starts, the director and staff recognized that the only reasonable way to address the problem of how to increase productivity across all companies in the defense industry was to help it help itself. Training was key and it must be done within industry and by industry. The men in charge were experienced and successful manufacturing executives, and they made a strategic decision that was critical to the program's success. They asked companies themselves what they needed in order to be more productive. By the end of the war they had dealt with 16,511 plants, which employed almost fourteen million people[2]. They were truly conducting an experiment on a grand scale.

THE FIVE NEEDS CONCEPT

As the TWI Service directors were sorting the input data, a pattern emerged that proved to be the basis for what they needed to do. Looking at all the personnel in any manufacturing organization, they knew that one critical employee was the first line supervisor whose role involves working directly between the workers and upper management. Because the fighting in the European theatre had created an "emergency situation" and the TWI Service did not have the resources to create a full-scale plan for an entire organization, they decided to focus on these supervisors.

With their knowledge of industry and the replies from the companies queried, the directors realized that every supervisor has five main needs, which have to be satisfied if he or she is to be successful. Mastering these Needs would result in success for these supervisors, which would result in success for the entire organization. Furthermore, these Needs could be broken down into two groups: knowledge or education and skills. Knowledge is the possession of information, facts, ideas, truths or principles that a person acquires by reading, listening and observing. A person either has a specific piece of knowledge or s/he does not. A Skill is the ability to do something well, usually gained through experience and training. People perform skills with varying levels of proficiency that are usually determined by practice and the amount of natural ability of the person. People practice a skill to increase their competency in it. Knowledge is acquired through study, while skills are determined by practice. We know today that these Needs apply not just to supervisors, but to all employees of all organizations.

The Five Needs are:
1. Knowledge of Work
2. Knowledge of Responsibilities
3. Skill in Instructing
4. Skill in Improving Methods
5. Skill in Leading

Knowledge of Work refers to the materials, tools, equipment, processes, and technical skills required for the specific organization's output. Knowledge of Responsibilities has to do with the policies, procedures, agreements, regulations, safety rules, schedules, interdepartmental relationships, organizational structure and hierarchy, etc. that are necessary for the successful operation of the particular organization. A person's Knowledge of Work tells him what to do in his job, while his Knowledge of Responsibilities tells him where he fits into the organization and what he must do to be successful in that position.

Skill in Instruction has to do with a person transferring his knowledge to others, either in formal training or whenever a direction is given. Skill in Improving Methods has to do with making improvements in what a person does by eliminating any form of waste, simplifying or consolidating procedures or changing a procedure. Skill in Leading deals with developing and maintaining strong, positive personal relationships with others.

Since the Service's objective was having industry train itself, any programs used for this purpose had to be easy enough for the majority of people to acquire. There would not be a sufficient amount of professional trainers available to achieve their goals, and thus the Programs had to be lucid enough to enable many people to become trainers. Furthermore, the Programs had to be standardized to the extent that they could be used in any organization. The same programs would have to be useable in a coalmine, an aircraft factory, or a bakery. Looking at the Five Needs, they realized that the technical aspects of a job (Knowledge of Work) varied so much from company to company and even from department to department within a company, that they could not reasonably create a standard training program for it. The same was true for the policies and procedures (Knowledge of Responsibilities) that affected employees. A general problem-solving approach was started in 1941 and completed in 1944, which addressed these 'knowledge' needs. Program Development was intended to teach Training Directors or other members of management to analyze situations and develop training that would address the specific issue at hand.

Although the 'knowledge needs' varied widely, the other three needs were skills that, if done properly, could be applied within any context. The directors were thus able to create a standardized program for each of these needs. Job Instruction Training (JIT) addressed the issue of how one transfers his knowledge to another. Job Methods Training (JMT) addressed continual improvement and Job Relations Training (JRT) taught people how to develop and maintain good personnel relationships. Together these are often referred to as the three "J" Programs.

THE TWI "J" PROGRAMS

The TWI Service used the word 'job' in the title of each of the programs because they wanted to reflect the idea that the training was practical, useful and could be used for any job. Indeed, before the end of the war, these programs came to be used not only in factories but also on farms and in offices and hospitals. The programs were extremely successful and were delivered to over 1¾ million employees within the 16,511 plants. IBM, Kodak and Bausch & Lomb are just a few of the companies that used these Programs extensively. Many companies wrote letters thanking the Service for these Programs and its efforts. Tom Watson, President of IBM wrote to S.B. Morse of the Service saying how much the programs helped his company.[3] Industry was so appreciative that in 1944, the State Chambers of Commerce of the USA presented "Industry's Award" to the TWI Service. In his presentation speech, Thomas Jones, President of the N.J. State Chamber of Commerce, said that this was, "the first recorded instance in which an appreciative industry decorates a government agency."[4] The Service was closed after the war because it had been created for the war.

Although TWI was no longer a government run service, two private companies were formed in the USA to continue its development, implementation and use. The TWI Foundation was a membership of companies that used and further developed the programs, and TWI, Inc. was a consulting firm that delivered the programs and developed trainers. General McArthur's staff recognized the need for these programs in Japan as they began rebuilding that country after the war and so TWI training manuals and other pertinent documents were given to the Japanese. Because of the nature of the "hands on" aspect, reading training manuals is not sufficient to become skilled in using these Programs and thus the Programs initially

were not very useful in Japan. As simple as the concepts are, one must be shown how to use them. Thus, TWI Inc. was awarded a contract to teach the Japanese the three "J" Programs over the course of six months in 1951.[5] Only then did these Programs become a factor in Japanese industry. Although there is much evidence of TWI's influence throughout Japanese companies, perhaps the most obvious one is that the Job Methods Program has been shown to be the basis for Kaizen. [6] Consequently, the TWI Programs have been used in Japan from then until today, but their use had faded in the USA by the mid 1970's. The result was that the TWI programs were alive in America only in academia where papers continued to be written about them. In Japan, however, the programs were being used as intended, thus giving their practitioners improvements in productivity, quality, safety, and cost. Although many Japanese companies use these programs, and derivations of them, today the most notable user is Toyota because of its connection to Lean Production.

CURRENT STATUS OF THE TWI "J" PROGRAMS

Many companies around the world are attempting to emulate the Toyota Production System (TPS) with a concept called Lean Production. Study of the TPS revealed that the TWI "J" Programs are actually a foundational part of the TPS. Toyota has been using these programs since they acquired them in 1951. Since that time, they have absorbed Job Methods Training and Job Relations Training into their own training programs, while Job Instruction Training remains fairly true to its original form. Because of the discovery that Toyota has successfully implemented the concepts and some of the format of the "J" Programs, their reintroduction began in the USA and is spreading to other countries around the world.

Skeptics question how programs developed in 1940 can be useful today because of the gains that have been made in technology, training and organizational development. Computers were only in the minds of researchers in 1940, yet most people use one today on a daily basis. How can a seventy-year old program train someone to use a computer? The short answer to the question is that although technology has changed, our culture is different, and we have learned much about societies, people are pretty much as they were seventy years ago. Consequently, similar productivity and quality gains can be made today as they were before. In fact, most of the organizations that have recently introduced them into their cultures, find that the Programs enable them to make significant gains no matter how "lean" the organization thought it was. For example, IBM reintroduced the Programs in late 2005 and now has delivered one or more of the Programs to over 2000 employees. A decision was made to expand the training beyond the initial group because of the significant benefits it produced. People who experience these programs quickly see their power and simplicity. But a key is that one must experience them to appreciate them.

The Programs are spreading slowly and more people are learning how to become trainers so they can deliver them to others. However, there are several reasons why these programs are not spreading as quickly as they could. First, there is no independent, objective organization to oversee TWI for both quality and development as the Service did in the 1940's. As a result, only competing consulting firms are driving this effort, and therefore there is no central control of the programs' quality. For example, some consultants offer the Program in one or two-day time periods, which is contrary to one of the major precepts (noted below) and diminishes the quality of material absorption. Also, some consultants are treating the programs as another

"buzz word" and only see an opportunity for an additional product to sell, similar to the push for Management by Objectives, Quality Circles, etc. The Programs are often seen as just another training program. Although training programs were scarce in the 1940's, they proliferate today and a common reaction is that the company already does this training. In fact, the TWI Programs should be seen as a necessary and foundational piece of any successful organization's culture. These programs change how employees think about their jobs and thus can change the culture of an organization. Another reason for the slow acceptance is that some consultants who are trained to deliver one or more of the programs do that but nothing more. In fact, the 10 hours of training is the easiest part of TWI. Knowing how to fully implement these programs into an organization's culture takes far more time and effort. The mistake that was made in Japan in 1948 is being repeated today: following the training manual is not enough to acquire successful implementation, without which any program will fail. Some people are not willing to invest the time and effort, perhaps because they do not see the likely outcomes.

THE CORE ADVANTAGE

How are the TWI Programs more than just another set of training programs and why would it be said that they are a "necessary and foundational piece of any successful organization's culture?" Alan Robinson answered those questions when he said, in effect, that "the TWI Programs are more relevant today than they were when they were developed because they get employees engaged in their work."[7] Earlier, in a paper in the California Management Review, he had written, "The TWI programs are distinctive, not because of the accepted principles of good management they cover, but because they are successful in getting these *used*."[8] The power of the TWI Programs then is that, when properly implemented, they touch all employees and harness everyone's intellect and energy to address problems on a daily basis.[9] Problem solving is not restricted to a few "black belts" or managers but is integrated throughout the organization, improving, communication, teamwork and morale.

When people read about these programs and then hear the claims made, a common reaction is that this is too good to be true. The reality is that the claims are valid, but correct implementation does require time and effort. Understanding how this is possible requires knowing how the programs mesh with various management styles.

MANAGEMENT STYLE

Management style has evolved during the 20th century and it is still changing today. Cost has always been an important metric, but the introduction of mass production in the early 20th century brought the concern of productivity to the forefront. This means getting the product "out the door" with as little cost as possible and as soon as possible. As competition increased, quality was also included as a metric to watch. In the USA the creation of the Occupational Safety & Health Administration (OSHA) in 1970 forced all managers to be aware of safety policies and procedures. Hence cost, productivity, quality and safety became the main metrics driving most managers. Very often, moreover, they could not achieve all four at the same time and one or more would suffer.

More and more, managers are now realizing that employees really are an organization's most important resource and they are treating them as such. There is more talk about morale, teamwork, communication, and respect for the individual. Managers who now achieve success with the four metrics of cost, quality, productivity and personnel, are rising above their peers because they recognize that it is the 'personnel' factor that actually drives the other three. But since these "people focused" metrics (aka soft skills) have been a part of management style for only the last 10-30 years, it would seem that the TWI Programs cannot contribute today since it appears that these Programs focus only on improving productivity, quality, cost and safety (aka hard skills). The key to this dilemma is that the TWI developers integrated hard and soft skills into one package. The uniqueness of the TWI Programs lies in the fact that they solve the classic problems, but they do it by getting all employees involved to improve the personnel factors. Morale improves as a result. Soft skill instruction such as offsite "teambuilding sessions" are not required because they occur onsite naturally, integrated with implementation of the Programs.

Improved communication also occurs because employees are put into situations where they must exchange ideas about how they do their jobs. Personnel issues that might act as distractions are avoided because people focus on their work. Each of the "J" Programs is powerful in itself and thus can stand by itself, but the effects are multiplied when the separate Programs are used together as a package. The intent is to create an empowering environment for people and get them to think differently about their work, which will make them behave differently. This results in a change in organizational culture.

HOW THE TWI "J" PROGRAMS ACHIEVE THEIR OBJECTIVES

The three programs vary in what they achieve and how they achieve it although they contain common precepts. A requirement for all of them is that training focuses on solving a real problem identified within the workplace. Training is not done for its own sake. Once a problem has been defined, it can be determined if one, all or none of the programs are applicable. If they are applicable, metrics should be obvious and thus an evaluation of Return on Investment (ROI) should be straight forward at some time in the future.

Another commonality is the format: two hours per day over five days. It is difficult for most people to pay attention for more than two hours at a time; and as intuitive as the concepts are, it requires several days for most people to fully absorb them. This concept of Distributed Practice has proven itself since the Programs were designed in 1940. As noted above, diverting from this format results in Participants who believe they know the material but may not fully grasp it (rote learning). This results in the Program not working as well as it should in practice, which may result in its disuse. Distributed Practice may be familiar to educators, but it probably is not to most managers who believe that any job can be done in less time. The Programs have been parsed to their essentials and nothing can be removed without reducing their effectiveness. Every action is necessary and has a specific purpose, so the ten hours is required. Distributed Practice is one of the precepts of TWI that makes it successful, which means it should not be delivered in one, two or three days. (A Program can be delivered in four days by an experienced trainer.)

Finally, each program is based on "learning by doing." This requires participants to perform what it is they are learning. Only when someone physically performs an activity do you know whether s/he can actually do it. Consequently, if a Participant does not demonstrate performance, the training may have had no value. Benefits to all three programs are improved

communication, teamwork and morale and reduced employee turnover. Many of the benefits are often recognized or experienced by the Participants during the 10-hour session and this is one reason that Participants enthusiastically want to use them when the formal training sessions end.

Job Instruction Training

The main objective of JIT (Job Instruction Training) is to teach an individual how to instruct someone to do a job. An employee may know how to do a job very well, but that does not mean s/he knows how to tell someone else how to do it. As stated, a problem must be defined and for JIT the problem may be that everyone is doing the job differently. Non-standard work results in non-standard quality and that is a problem. In addition to different qualities, there may be differences in scrap rate, time or other factors. In order to instruct someone on a job, a person must know the job well. During the five sessions, we thus have each Participant breakdown a job into its fine points and write them down on a Job Breakdown Sheet. One Participant said that, after breaking down a job, he thought more deeply about it than he did when he was doing the same job for his own company.

Once a job has been 'broken down', we obtain consensus from others who may have input. We might have watched an 'expert' perform the job, but we realize that others may have valuable additional input. We thus seek opinions from others. During this time even experienced employees realize that they can learn from others. The one best way (known at this time) is used for the final Job Breakdown Sheet. When the instructor is ready, all employees who perform this job are instructed. The instructor takes into account the skill and experience of the trainee and so the instruction may vary from individual to individual. This is one reason the training is only done with one person at a time. Note that although the instruction may vary from person to person, following the Job Breakdown Sheet assures that the job is always performed according to the standard method that was intended.

It is sometimes said that a certain person cannot be trained in a given job. In JIT, the motto is, "If the person hasn't learned, the instructor hasn't taught." The two caveats to this are that the person must have the attitude and the aptitude to do the job. Attitude is usually not a problem because the person willingly comes to work and we are not asking him to perform an unsafe act. Aptitude is more physical than mental since mental qualifications are determined as an employee passes through company application and induction. Physical disabilities that might put someone into a job s/he cannot do would include colorblindness. One could not teach a colorblind person how to read color codes, for example. The complete activity of preparing and delivering JIT creates an environment where employees become more engaged in their work, more empowered, and more collaborative. They do this, not because they are told to, but because it is natural to improving their jobs. An additional result is a decrease in employee turnover because people are more confident in what they do. They are not learning by trial and error.

Job Methods Training

JMT (Job Methods Training) is similar to JIT in that the employee breaks down a given job, but the difference here is that the focus is on improving how that job is done. JIT can result in job improvements because people are thinking about their jobs in a different way, but JMT has the individual systematically question every detail about the job. JMT recognizes that everyone has ideas, but not everyone knows how to vet, sell or implement them. This is what is learned in the JMT sessions. The improvements are not intended to be department or company-wide changes but small changes that will make the individual more productive. Furthermore, many small improvements, like grains of sand on a beach, collectively will improve the whole organization. The driving force is eliminating waste. In order for this to happen without negatively affecting others, the individual must consult with others who might be affected. Suggestions are sought and permissions are granted when necessary. The employee must then sell the change to his immediate supervisor and any other person who is affected. Proposing the change naturally empowers the employee and improves teamwork and communication, in turn improving morale. Note that this is an "implementation system" and not a "suggestion system." As such there often is no substantial monetary award. People implement changes because they do not have to work as hard to get the same or better results in what they do.

Job Relations Training

JRT (Job Relations Training) helps people develop and maintain good personal relationships. Although it is valuable for everyone to receive this training, it is usually given only to people who supervise others since only they are responsible for solving personnel problems. A simple procedure is taught, which reflects the Scientific Method. In addition, fundamentals are explained and discussed, giving guidelines of how to deal with people. It is intended that the participants receive training on not only how to resolve any personnel issue but also how to prevent issues from becoming so large that they become difficult to handle. The result is a standard way which supervisors at all levels deal with personnel problems. This helps to reduce favoritism and consequently increases morale. Participants learn that good employee relations really are a good business practice.

IMPLEMENTING AND SUSTAINING THE TWI "J" PROGRAMS [10]

As mentioned, the training of the TWI "J" Programs is perhaps the easiest part of using them. Implementation takes time, thought and planning. Once an organization starts using them, the factors that were used must be sustained. The following is a summary of the major requirements for implementation and sustainment.

Top Management Backing

Management must recognize that there can be a temporary reduction in production but that it will be greatly compensated for in the near future. TWI programs cost time and money and will be an addition to employees' jobs as they perform them now. The CEO and his/her staff should not only be aware of implementing the programs, but s/he should also make it a part of the overall strategy. If the CEO and staff believe it is just another training program, it won't have the backing it deserves. If, however, they realize that it is a problem-solving/culture-changing tool that forms a foundation for success, they will support it by making the correct decisions when questions arise about the programs. The best way for anyone to appreciate what the programs can do is to participate in the training. Upper and middle management may not use the programs formally, but they should use the concepts in their thinking. The training of these programs should start from the top.

Management Support

Since the programs take time, people must be given that time. Instruction and Methods Improvement must be considered to be a part of each employee's job. Budgets and schedules must be modified. It is important that any TWI metrics be ones for which management is responsible. While there is a temporary cost to the organization in trainers' fees, employees' time and activities and usage of their salaries, the rewards to the organization will more than offset these costs.

Line Organization Participation

Everyone can benefit personally and professionally from using the TWI programs, but initially not everyone will be using them. However, when a group of employees starts using one of the programs, the line management (all supervisors) attached to that group should take an active interest by seeking metrics and results. After all, they are responsible for quality and productivity. They should also participate in a 10-hour session so they have experienced the programs. Unless a person has participated in a program, it is very difficult to have a deep understanding of its value. This also changes it from being "The Training Department's program" to "This is our company's program. This is the way we do things now."

Assignment of a Coordinator

"If everyone is responsible, no one is responsible." Someone must be assigned to coordinate the TWI effort. Tasks would include

1- arranging for the 10-hour sessions,
2- seeing who is included and when,
3-following up with supervisors after the training to see how it is being used and to offer input as needed,
4- getting and distributing results,
5- coaching others in use of the programs after the training,
6- maintaining an adequate supply of coaches
7- delivering the 10-hour programs if they have been trained to do so,
8-facilitating groups for getting consensus and review,
9- helping people identify problems that can be solved or reduced through the use of the programs, etc.

This usually starts as a part time position and evolves into a full time position as productivity improvements free up resources.

Correct Use of the Training Programs

All training should be considered to be utilitarian, that is, a problem-solving tool which would benefit the company. We should not train for the sake of training but to address a particular problem. Therefore, when we measure the success of the training, we measure how well the particular problem has been solved and not the extent of the training. If the problem has been solved and we do not anticipate it returning, the training is no longer necessary and should be stopped.

Quality Institutes for Instructors

The Programs must be delivered strictly as written so that quality does not diminish. As people become familiar with the programs, it may become tempting to "simplify" or "condense" the material or activities. A good trainer realizes that the programs have been structured as simply and densely as is possible and any changes made would be in augmenting them when fitting them to an organization. In no case should any of the main principles be altered because that would decrease their effectiveness. For example, the use of distributed practice should be maintained. Periodic audits should be conducted on the 10-hour programs to verify that standardization is maintained. Non-standard training leads to non-standard work. If there is any question on the quality of the training institute (10-hour training), a responsible agent of the organization should contact the Institute Conductor who trained the trainers. Finally, a qualified trainer should, on the average, develop at least one coach in every 10-hour session (per 10 participants).

Schedule for complete coverage

The TWI programs can change an organization's culture only if everyone knows about them and uses them. These Programs enable and reinforce the 3 "C"s of culture: Comradeship, Cooperation and Cohesiveness, i.e. the personality of an organization. As the Programs are implemented, the participants feel a bonding with each other, a degree of mutual goals and unity within the workforce. That requires that employees think in a similar way and use the same language. If one person talks about "key points" and the other person does not know the term, communication will be difficult. The TWI Coordinator should make sure that the entire organization receives the 10-hour programs and that refresher sessions are scheduled as needed. Everyone from CEO's to new hires should receive the training.

Coaching to Get Continual Results

During the 10-hour Program each Participant demonstrates the method being taught. In preparation for this demonstration, each Participant is coached on a one-to-one basis by the trainer. At the end of the 10-hour Program, generally, they will be knowledgeable but not yet proficient in the method; and thus on-the-job coaching is required for the employee to sharpen his/her skills.

Coaching is not 'telling' but rather helping the employee to recognize strengths and weaknesses in his performance. That means the coach must be able to determine these strengths and weaknesses and then decide how to make improvements. This is why selected Participants should be trained as coaches during every 10-hour session.

Auditing

Some goals of the 10-hour training sessions are to have the participants understand why they should use the new method and also to get them to want to use it. In spite of this, some old habits will take time to be changed. Thus, audits should be conducted for all participants in all programs to verify that the new methods are being used. The audits are not done for discipline but for correction and learning. If someone has a better method, it should be vetted and shared with everyone so that it becomes the new standard. If the participant's method is not better, s/he should understand why they should not be using it.

Reporting of Results

The TWI Programs are problem-solving tools and as such, they should show results if they are to be used continually. Training or making changes should not be made for their own sake but to improve the organization. Quantifying results is important so the supervisor concerned (first line, second line, manager, director, VP, etc.) can determine if the effort is worthwhile and whether or not activities should be changed. Reporting results is important because, in the philosophy of visual management, everyone can see what is happening.

SUMMARY

The TWI Programs contain simple yet powerful methods to teach fundamental skills that can help people at any level of any organization become more productive. The power of the TWI Programs is that, when properly implemented, they touch all employees and harness everyone's intellect and energy to address problems on a daily basis. Moreover they do this by focusing on the 'hard' skills of improving quality, cost, productivity and safety while using the 'soft' skills of improved communication, teamwork and morale. The skills taught are ones that everyone can learn, and thus every organization can become more effective by implementing the TWI Programs into its culture. In order for this to happen, all employees must be involved. Some costs will be acquired in both time and money, but the payback will far outweigh the costs.

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