# SPANNING THE FUNCTIONAL DIVIDE

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Improvement can fall into two main categories: technical based or people based. Consequently, improvement practitioners usually have specialized in one of these groups. They focus on either processes and products using what could be termed "hard or technical skills" (Lean Thinking, Six Sigma) or they focus on human behavior, using what could be termed "soft skills" (OD, HR Development). However, both skills are required to implement and sustain improvements.

PEOPLE GENERALLY WANT to improve whatever it is they do in order to make their jobs easier, simpler, and faster. Improvements can fall into two main categories: technical (or those dealing with things or processes), and behavioral (or those dealing with people). We often refer to technical skills as "hard" skills and behavioral skills as "soft" skills. When a person is acting alone, these two are combined. However, when two or more people are involved in doing something, the technical and behavioral skill sets can become separated. There are several reasons for this, but a main one is that technical problems tend to be easier to see and solve than behavioral problems. As a result, problem solvers typically specialize in one of the two categories. Although the two groups are separate, Training Within Industry is a program that links the two. In addition, either group can use that program as leverage to increase their knowledge in the other.

## MANAGEMENT STYLES

When people form into organizations, they generally form hierarchies, which can be called "management." For this article, managers equate with leaders. Managers are really problem solvers, and thus their chosen management style is really their problem-solving style. How do we address situations that are preventing us from accomplishing our objectives?

Management styles have evolved over the years, but today we consider two general types that reflect the problem-solving style used. Note that when one looks at a specific organization, the management style will most likely be a blend of the two, so in reality we are describing a spectrum. For clarity of discussion, the technical, "hard skill" management type is denoted as command and control or unilateral control and the behavioral or "soft skill" management style is denoted as servant leadership or mutual learning. Tables 1–3 are based on the work of Schwartz (2002) initially described by Argyris and Schön; they compare values, assumptions, and results of the unilateral control model (Schwartz, 2002, p. 71) with those of the mutual learning model (Schwartz, 2002, p. 87).

Historically, society has lent itself to the unilateral control model, most likely because it is easier to use. It is easier to get someone to do something (control their behavior) by offering a reward or a punishment (Kohn, 1993) than it is to get the person to do something because he or she wants to, resulting in "free and informed choice." Vetting and sharing information and achieving consensus where required is more time consuming and difficult than knowing what you want to do and doing it. In addition, problem solvers may categorize people, not recognizing the fact that every individual is different (*Training Within Industry Service*, 1944, p. 114). According to this source, "Supervisors get new people all the time but handbooks don't come with them" (p. 17). Throughout history there are some exceptions to the use of unilateral control; one notable exception is the Lewis and Clark expedition of 1804 to 1806 where everyone in the expedition had a voice in every major decision

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and everyone was recognized for his or her particular strengths, weaknesses, and skills. Generally, however, society seemed to favor unilateral control.

Although many governments have evolved from being autocratic to being democratic, management styles have mainly stayed with unilateral control and being autocratic. As with governments, businesses are seeing weaknesses in the unilateral control style of management. The evolution is slow, because using a mutual learning model is difficult and perhaps more time consuming. Therefore, people may not actually use it even though they may want to.

The unilateral control model was strongly reinforced in the United States at the beginning of the 20th century as Americans were moving from an agricultural to an industrial society. The model initially was very successful; Henry Ford gave many people the opportunity to own their own cars, and George Eastman enabled people to capture their personal memories in photographs. This model was so prevalent and so successful that many people may have thought it was the only model. It has evolved over time, and peripheral tools have been named to define parts of it. Scientific management, management by objectives (MBO), theory of constraints, quality circles (QC), total quality management (TQM), Lean Thinking, and Six Sigma are only some of the efforts to improve on the unilateral control model's weaknesses. Each of these, except for Lean Thinking and Six Sigma, have lost favor over the years because they all neglected to include a behavioral aspect. Although Lean Thinking and Six Sigma have begun to adopt some behavior concepts, they are still based on technical skills.

The mutual learning model, as described earlier, is supported by human performance technology (HPT) and is based on behavioral skills. It should be noted that here, too, a movement has begun to broaden its scope by incorporating technical skills into human performance technology's methodology. Six Sigma, for example, is noted in the *Handbook of Human Performance Technology* (Van Tiem et al., 2006, p. 692). Although both sets of skills are beginning to adopt characteristics of the other, they are still separate. That is a problem, because both are needed to satisfactorily address today's problems. The day should come when we do not speak of technical or behavioral skills but rather of leadership skills, which include both. Understanding why these skill sets are separate will lead us to determining how to bring them together so that we are in a stronger position to address opportunities.

**TABLE 1 CORE VALUES OF MANAGEMENT MODELS**

| UNILATERAL CONTROL MODEL | | MUTUAL LEARNING MODEL | |
|---|---|---|---|
| 1 | Achieve my goal through unilateral control | 1 | Valid information—share all information relevant to an issue |
| 2 | Win, do not lose | 2 | Free and informed choice—define your own objectives and methods for achieving them |
| 3 | Minimize expressing negative feelings | 3 | Internal commitment to the choice—intrinsically satisfying, not due to external rewards or punishments |
| 4 | Act rationally | 4 | Compassion—suspend judgment toward yourself and others |

**TABLE 2 ASSUMPTIONS OF MANAGEMENT MODELS**

| UNILATERAL CONTROL MODEL | | MUTUAL LEARNING MODEL | |
|---|---|---|---|
| 1 | I understand the situation; those who see it differently do not. | 1 | I have some information; others have some information. |
| 2 | I am right; those who disagree are wrong. | 2 | Each of us may see things others do not. |
| 3 | I have pure motives; those who disagree have questionable motives. | 3 | Differences are opportunities for learning. |
| 4 | My feelings are justified. | 4 | People are trying to act with integrity. |

## Step 1: Visibility

In seeking to increase productivity, we often use the scientific method, which is a universal process of solving any problem, technical or behavioral. We must first see the problem, then analyze it, then take some action based on our analysis, then check to see if what we did resulted in what we wanted to do. Recently, the acronyms PDCA (plan, do, check, act; Pyzdek, 2001, p. 8) or DMAIC (define, measure, analyze, improve, control; Van Tiem, Dessinger, & Moseley, 2006, p. 695) are often cited as the problem-solving methods of choice, but many companies have their own versions, listing as many as 12 steps or more. The fact remains that they are all based on the scientific method.

The iceberg principle is useful in seeing and analyzing situations in organizations (see Figure 1). The principle gets its name from the fact that only about one-tenth of an iceberg's volume is above water and thus visible, while the other nine-tenths are unseen. This means that when we identify a situation that must be addressed, we should be aware that in many (or most) situations only a very small amount (the "tip") of the information is available or visible, whereas the "real" information or the "bulk" of the data is either unavailable or hidden. In a 1989 paper, Sydney Yoshida presented "the iceberg of ignorance," which displayed how aware people were of an organization's problems (Chakrapani, 1991). He noted that senior management is aware of only 4% of an organization's problems, while those who do the work are aware of 100%. Line employees would include both those making the actual product and those assisting in indirect labor jobs: inspectors, engineers, administrative assistants, clerks, and others. It appears that the higher people rise in an organization, the more visibility they have but the fewer details they can see. People can absorb only so much information, and as people gain visibility, they must lose detail; it is the details that expose and define the problems. This has nothing to do with competency but only with one's position and responsibilities in an organization. Further, note that although the line employees may collectively know 100% of all the problems, each line employee is aware of 100% of only those problems that affect that particular individual.

This tells us that if we wish to improve the organization overall, we should seek information from everyone. If we do not, we will not identify all the problems that need correcting. In addition, since the person doing a given job knows it better than anyone else, that person should be consulted when improvements are sought. The people who do the job are the only people who really know how the job is done on a daily basis.

## Step 2: Analysis

The iceberg principle can also be used to describe an analysis of a problem or situation (see Figure 2). In this application, we readily see the events and actions that are taking place, while the forces usually creating the problem remain below the surface and are more difficult to see. When we react to the events and actions as we see them without accounting for the underlying physical systems and behaviors, we find that even if we can make an improvement, it is not effective or sustained. This happens because, while the physical systems that are used are closer to the surface and thus easier to see, we are often ignoring all the interacting elements or we

**TABLE 3 RESULTS OF MANAGEMENT MODELS**

| UNILATERAL CONTROL MODEL | | MUTUAL LEARNING MODEL | |
|---|---|---|---|
| 1 | Misunderstanding, conflicts, and defensiveness | 1 | Increased understanding; reduced conflicts and defensiveness |
| 2 | Mistrust | 2 | Increased trust |
| 3 | Self-fulfilling processes | 3 | Fewer self-fulfilling processes |
| 4 | Limited learning | 4 | Increased learning |
| 5 | Reduced effectiveness | 5 | Increased effectiveness |
| 6 | Reduced quality of work life | 6 | Increased quality of work life |

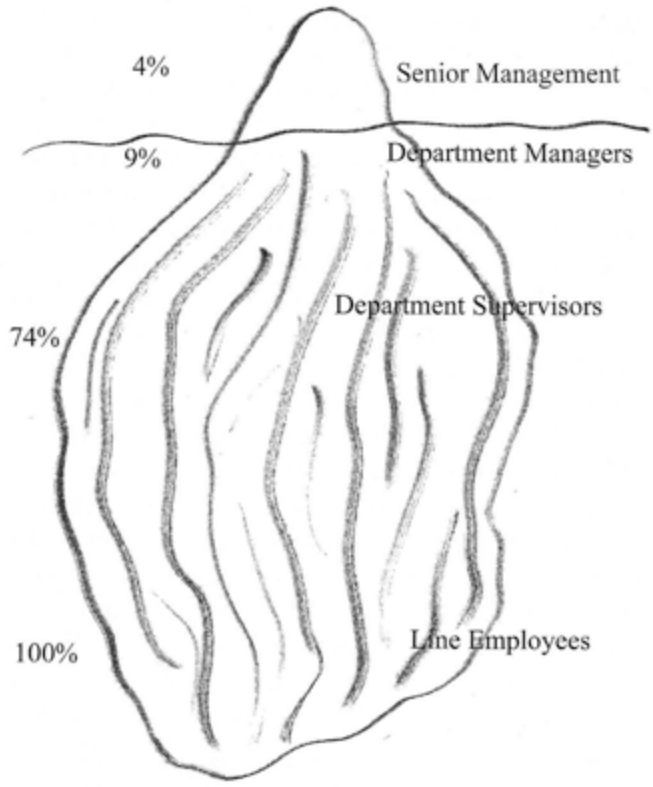


FIGURE 1. PROBLEM AWARENESS

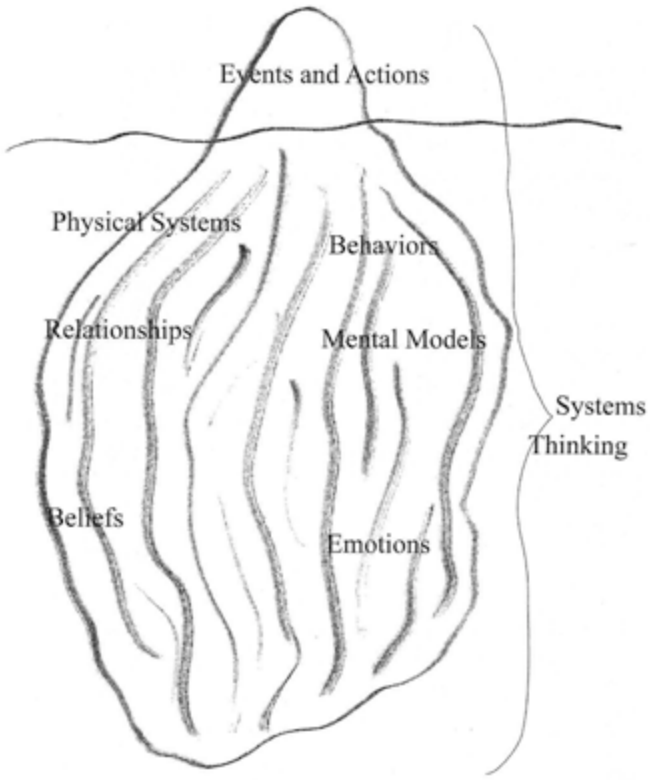


FIGURE 2. PROBLEM ANALYSIS

may see only the formal system—the one meant to be used, not the informal one that is actually being used. In order to do a complete analysis of the situation, we must employ systems thinking, which considers both physical systems and interacting elements. Systems thinking is the process of understanding how all elements of a system influence every other element—people, objects, or processes. It includes people's behaviors and their emotions. As Senge (2006) says, "Today, systems thinking is needed more than ever because we are becoming overwhelmed by complexity" (p. 69). As with physical systems, we see some behaviors and actions that reflect emotions, but we may be blind to many others. Beliefs are known only when we know someone well, but even then our awareness of these beliefs depends on how open the person is.

## Step 3: Solutions

Over the years, many programs have claimed to be the best and easiest way to increase the overall success of any organization. Some of these programs or methods just put a name on something that already has been done. That is not altogether bad; these programs define a method and tell people what they are talking about. However, when someone tries to structure those actions into a model or formal process, the consequence often is that the method loses favor. That is, the specific actions may work in one situation, but they do not work when they are generalized. If the actions are not structured into a workable model, they will not work in every case. The result of this is that people become skeptical of any "new" model when it is proposed.

Lean Thinking is the embodiment of Toyota's production system. When U.S. auto manufacturers finally realized that Toyota was as successful as it is because of its production system and not because of government help, they naturally wanted to duplicate that system in their plants. In doing so, they copied the observable tools, which Toyota freely let them do. Many people who eagerly toured Toyota's facilities often asked themselves why a company would expose its secrets to its competitors. The answer was that Toyota was not revealing its real secret, because it couldn't. Toyota's real secret to success is the way its employees think and act. The thinking is not visible, and the acting is difficult to see. Consequently, plants that use 5S (sort, set in order, shine, standardize, sustain) or VSM (value stream mapping) or any other Lean tool may make some initial progress, but they are far from emulating Toyota's system. Furthermore, unless employees change their ways

of thinking and thus their behavior, operations usually return to the way they were. People can reproduce the "technical skills" (the visible tools), but they are not reproducing the "behavioral skills" that change what employees freely want to do.

Human performance technology (HPT) is the body of knowledge that is seen as a systemic learning and development strategy and addresses peoples' behavior. According to Pershing (2006), a definition of HPT is "the study and ethical practice of improving productivity in organizations by designing and developing effective interventions that are results-oriented, comprehensive and systemic." (p. 6). The operative word in this definition is "intervention[s]," which is an action affecting what someone is doing (and which is not used in Lean). The implication and actual outcome is that HPT focuses on accomplishments (improving productivity) by dealing with people's behaviors. Note that this is not just a matter of changing what someone does but of changing what someone does when no one is watching (i.e., what someone wants to do). This is noted by the Training Within Industry Service (1944) when it wrote, "Good supervision means that the supervisor gets the people in his department to do *what* he wants done, *when* it should be done, and the *way* he wants it done, because *they* want to do it" (p. 18).

HPT consists of many areas of study and practice, such as human resource development (HRD), organization development (OD), organization effectiveness (OE), and learning organizations (LO). Each of these disciplines has its own focus, and many areas overlap. As I mentioned previously, they are often referred to collectively as incorporating "soft skills" or "human behavioral skills."

When addressing any problem or situation, one must determine whether technical skills, behavioral skills, or a combination should be applied (see Figure 3). Usually, both are needed. However, there is a gap between the world of Lean/Six Sigma and HPT. Consequently, proponents of "technical skills," such as production managers and engineers, apply what they know, while proponents of the "behavioral skills," who usually work in the human resource (HR) or organization development (OD) areas of an organization, apply what they know. The result is that neither solves the problem completely. People who attend Lean conferences do not usually attend HPT conferences and vice versa. Both bodies of knowledge are large, and thus being "expert" in both is rare. I recently presented this information at a conference. Of the 29 people who attended my presentation, all used Lean Thinking or were very familiar with it. Most were familiar with Six Sigma. None had ever heard of HPT or could give a definition of a learning organization. This cannot be considered a scientific study by any means, but in my experience, it does reflect reality.

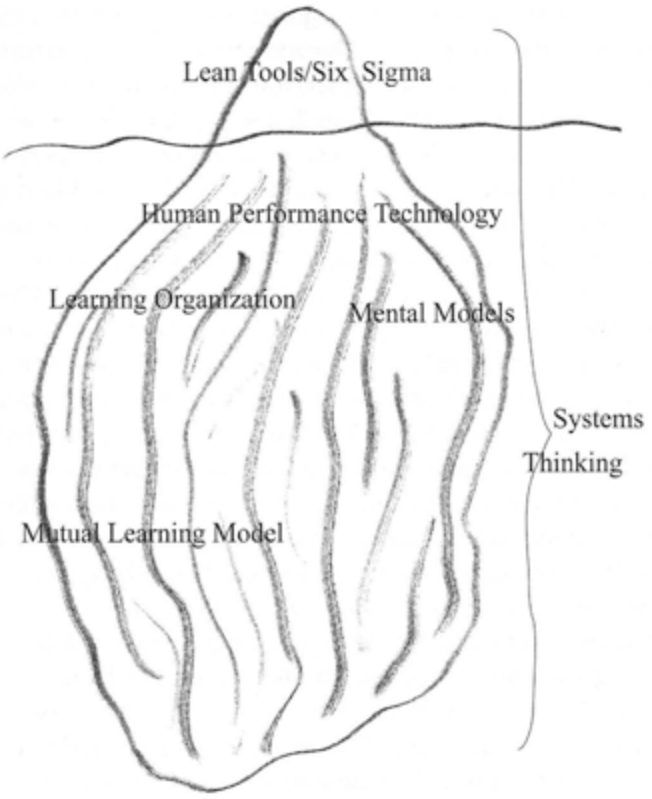


FIGURE 3. PROBLEM SOLUTIONS

## THE TRAINING WITHIN INDUSTRY PROGRAMS

There is, however, a body of knowledge that bridges this functional divide, a program that was created over 70 years ago. It was created when the United States was in what was euphemistically called an "emergency situation"—that is, World War II. Because of the "emergency situation" everyone knew the overall objective and did their best mentally and physically to achieve their personal, congruent objectives.

These programs are the Training Within Industry (TWI) programs, and they have been used continuously since they were created, although not by the same organization. They were created in the United States between 1940 and 1945 and were used by U.S.-based companies until about 1970. They have been used continuously since 1951 in Japan and in other countries such as New Zealand. Today they are being reintroduced into the United States and other countries around the world, including Ireland, England, India, and China. The

people who are currently using these TWI programs are doing so because these programs continue to satisfy their needs. Because they were used for such a long time in the United States, anyone familiar with these programs can see their remnants in many programs being used today. The reason the programs are being reintroduced in their original form is that using the original programs as opposed to a derivative is the best way to obtain the critical concepts involved. Other "spin-off" programs are not so effective.

The way the TWI programs work is that people learn and use "technical skills" while subconsciously learning and using "behavioral skills." The former are quantifiable and are easier to learn and use because they involve processes, procedures, and machines. The latter are more difficult to comprehend, use, and master because we are dealing with people; as we know from the iceberg principle, much of what we have to consider is not visible. The result is that people are practicing "technical skills" by learning how to instruct (transfer knowledge), make changes (improvements), and solve personnel problems. At the same time they are developing "behavioral skills" by improving their communication, building trust, increasing empathy and teamwork, and so forth. The results of the technical improvements are often immediate and very visible, while the effects of the behavioral improvements take longer and may be more difficult to see. For example, the effect of Job Instruction Training (JIT) can be standard work, which is simply having a given job done the same way every time it is done, no matter who does it. This eliminates variability and results in improvements in quality, productivity, safety, and cost. This can be seen within a month or two of JIT's use, depending on the scope of the situation. Once JIT has been used for several months or a year, the observant manager will notice that there seem to be fewer problems than before, but many managers may not be able to put their finger on the exact cause. Looking more closely, one finds the culture has changed.

There are several publications that show how the TWI programs serve as a foundation for Lean Thinking (Dinero, 2005; Huntzinger, 2005; Robinson & Schroeder, 1993). Because TWI addresses both areas, these programs form a bridge between the two bodies of knowledge.

The study and practice of both technical and behavioral skill sets contain many disciplines, but because the TWI programs deal with fundamental skills, this connection or application can be made with any of the disciplines. Now that the mutual learning model (Schwartz, 2002, p. 87) has been explained, the skills required to use it will be compared with the skills developed when using JIT.

*The way the Training Within Industry (TWI) programs work is that people learn and use "technical skills" while subconsciously learning and using "behavioral skills."*

## USING JOB INSTRUCTION TRAINING

Job Instruction Training (JIT) is a method used to observe and analyze a task to break it down into its vital components so that all relevant knowledge of the task can easily be transferred. Because it is a standard method of training, it results in standard work being done. An observer takes specific notes on a job breakdown sheet (JBS) noting *what* is done, *how* it is done, and *why* it is done that way. The observer may or may not know the job, but the person doing the job should be one who does it well, the one who is probably the best in the department. The observer learns to ask questions about why something was done a certain way and whether it could be done another way. Even if the observer knows the answer, it should be questioned to determine the worker's complete knowledge of the job. An answer of "That's how I was trained" is not acceptable, and if the worker does not know why something is done, the observer finds out from someone else. This type of deep questioning uncovers all relevant information about the task. The observer records only those activities that affect quality, productivity, safety, or cost. All other information is irrelevant and is not included. As a result, improvements are often made to the process even though that was not the intent. After any task is analyzed to the extent done in JIT, areas for improvement become visible. If a possible improvement is considered, the worker should not implement it but should verify it with others during the consensus process.

When the JBS has been written, it is considered a draft document. The observer will then confer with every person who does the task and seeks his or her input so that a consensus regarding the process can be obtained. This population would not be limited to experienced workers but would include everyone who has a stake in the job regardless of experience, including all support personnel (quality, human resources, engineering, maintenance, safety, etc.). This may be the most difficult part, but it is the most important if standard work is an objective. In

arriving at a consensus, there will often be conflicting views, but a uniform process must be agreed upon. When there are strong opinions on two or more ways a part of a task is done, the participants will rely on data of some sort. An argument of "It's easier" or "I like it better" is not sufficient. The two different procedures will be performed and measured taking note of the relevant metrics. The categories of the metrics that are relevant are quality, safety, productivity, and cost (in random order).

Once consensus has been obtained, everyone who currently does the task will be retrained according to the current job breakdown sheet. Confirmation of the training is seen as the worker's performing the job according to the JBS and being able to explain the what, how, and why of all relevant actions. After having been retrained, all workers are audited at certain intervals to confirm that they are following the JBS. The audits are viewed as learning opportunities and should not be punitive. Everyone who does the task has now agreed that the process described by the JBS is the best way to do it. If someone is now doing something differently, the question asked is Why? If the worker has found a better way to do the task, the new method should be verified and then shared with the remaining workers via a revised JBS. The worker who had been audited should be told the proper way to initiate a change.

## CONNECTING TRAINING WITHIN INDUSTRY SKILLS WITH MUTUAL LEARNING MODEL SKILLS

The mutual learning model appears to be formatted from the pattern of the training within industry (TWI) programs. It seeks to develop all the skills that the TWI programs inherently get practitioners to use. In his book *The Skilled Facilitator* (2002), Roger Schwartz argues that

> [O]perating out of the *Mutual Learning Model* means the individual starts with the values that people make free and informed choices based on shared and valid information. An individual operating out of this model believes he or she has some of the needed information and the others involved have additional needed information. Through the sharing of information and different ideas, everyone has the opportunity to learn more. Thus, the parties involved in a difficult situation may end up changing their perspectives, leading to new and fresh outcomes. Consequences of operating out of this model are increased understanding and trust with the reduced need for defensiveness. (p. 95)

Schwartz cites nine strategies (he also calls them ground rules) that are used in the mutual learning model (see Table 4; Schwartz, 2002, p. 97).

While Schwartz's nine strategies are valuable, it is often unclear how best to develop them. I suggest that the methods of TWI do not just improve technical skills but also address Schwartz's behavioral skills. Anyone who has seen a JBS being written and consensus being attained can readily see how the people using the job instruction training (JIT) method naturally use, practice, and learn the skills noted in Schwartz's nine points and in the preceding paragraph. For those less familiar with the JIT method, Table 5 offers some explanation.

To summarize Table 5 with respect to JIT, people are discussing a topic about which they have knowledge and an interest. Although they may initially try to convince someone of an idea through emotions, they quickly learn that data are the only practical commodity. The problems discussed (in the form of jobs) are not large but only a piece of what they do, so the conversations are manageable.

As the JIT method is used more and more and becomes "the way we instruct at ACME Co.," employees realize that their voices can be heard. They feel more of a part of the organization and are willing to share information. Communication improves and along with it so does teamwork. As job breakdown sheets are used for all tasks, employees know exactly what is expected of them, their performance can be quantified, and morale improves. Naturally this does not happen immediately, but as JIT spreads throughout the organization, the benefits grow.

## WHY DOES TRAINING WITHIN INDUSTRY WORK?

The TWI Service developed four programs, which form the basis of its concepts. Its intent and main objective in

**TABLE 4 SKILLS USED IN THE MUTUAL LEARNING MODEL**

| | |
|---|---|
| 1 | Test assumptions and inferences. |
| 2 | Share all relevant information. |
| 3 | Use specific examples, and agree on what important words mean. |
| 4 | Explain your reasoning and intent. |
| 5 | Focus on interests, not positions. |
| 6 | Combine advocacy and inquiry. |
| 7 | Jointly design next steps and ways to test disagreements. |
| 8 | Discuss undiscussable issues. |
| 9 | Use a decision-making rule that generates the level of commitment needed. |

**TABLE 5 THE PRACTICE OF JOB INSTRUCTION TRAINING USES THE NINE STRATEGIES**

| | STRATEGY | USE IN JOB INSTRUCTION TRAINING |
|---|---|---|
| 1 | Test assumptions and inferences. | For every variable action in a task, we ask why and are thus constantly questioning assumptions and inferences. |
| 2 | Share all relevant information. | In reaching consensus, all relevant information is shared and discussed. This is not difficult, because everyone is familiar with the job and the job is of reasonable size. |
| 3 | Use specific examples, and agree on what important words mean. | Since we are analyzing a specific task, we are discussing a very concrete subject, and many discussions can center on specific semantics. We are willing to identify technical terms that are common to experienced operators but would be confusing to novices. |
| 4 | Explain your reasoning and intent. | All actions must be substantiated with valid reasons. |
| 5 | Focus on interests, not positions. | An interest is a need, desire, or concern. A position is a solution or a place we want to be. We focus on needs because different needs can lead to the same solution. This is much easier to see and control when the job, situation, or problem is small and controllable, giving us an opportunity for practicing this skill. |
| 6 | Combine advocacy and inquiry. | Advocacy is saying what you believe to be true, and inquiry is learning what the other person believes. Both are used continually. People quickly learn that no matter how much experience they have, there are others (even with less experience) who have valid knowledge to offer. |
| 7 | Jointly design new steps and ways to test disagreements. | Disagreements in how the task is done will occur, but the deciding factor will be based on data that improve quality, safety, productivity, or cost. Emotions are controlled. |
| 8 | Discuss undiscussable issues. | As people gain trust and confidence in themselves, others, and the process, all topics will be discussed. |
| 9 | Use a decision-making rule that generates the level of commitment needed. | Everyone is committed to the final job breakdown sheet (JBS) because they all must agree to a standard JBS before it is used. |

1940 was to increase productivity among defense contractors in the United States so that sufficient material could be supplied to its allies, which were engaged in a war in Europe. The Service was in existence for only five years, but it soon discovered that the programs offered more than just quality and productivity improvements. By using these programs, communication, teamwork, and morale were also improved. Some other programs were developed after the Service closed in 1945, but they still remain peripheral to these four:

- Job instruction training (JIT)
- Job methods training (JMT)
- Job relations training (JRT)
- Program development (PD)

The first three programs collectively were known as the "J" programs. The intent was to use all four together, as needed, but they would be learned separately. This is similar to an engineer's learning mathematics, physics, strength of materials, and problem solving. He learns each one independently, but when he practices, he combines the four to address a problem.

The TWI programs act as a link between the visibility of a problem and the actual solving of it by developing fundamental skills that are necessary to engage and enable higher-level skills such as those described in the mutual learning model. In doing this, many of the so-called "behavioral" skills, such as effective communication, listening, and teamwork, are developed. Each "J" program is unique in that each one has its own objectives. JIT is intended to transfer knowledge and thus is used for instruction. Because it involves standard instruction, it can lead to standard work, which is a pillar of Lean Thinking. JMT teaches us to be inquisitive and to see waste and thus can form a basis for a continual improvement program. JRT addresses personnel issues and serves as a basis for leadership development.

Although each program is different, they all have common characteristics that make them as effective as they are. They all promote a questioning attitude, listening skills, obtaining consensus, and a focus on practical problems. The problems are not only work-related but involve actual jobs that the participants do. Therefore, the training participants could be considered experts. The jobs or situations chosen are not monumental; rather they

*The Training Within Industry (TWI) programs act as a link between the visibility of a problem and the actual solving of it.*

are small but important parts of what the participants do daily. The participants are given a little information at a time and sufficient repetition to make sure that they absorb the concepts and their application.

The TWI programs were developed to improve quality, safety, productivity, and cost, which they do very well. More importantly, perhaps, is the fact that they provide a learning format to develop skills that are necessary for both the individual and the organization to improve. The three "J" programs were developed in response to the needs of industry, which told us *what* needed to be done. By observing the use of the TWI programs, we can see *how* the programs work to create those accomplishments. In the spirit of JIT, however, we want to know *why* these programs work so well. Knowing *why* they work will give them more credibility and give us a better understanding of how to use them.

There are several characteristics that combine to make the TWI programs as successful as they are:

1. Interest and cooperation are created because the methods focus on what people do:
   a. Active participation
   b. On a familiar task
   c. Of manageable size
   d. Relevance is evident
   e. Effect on the individual (value) is evident
   f. Effect on the organization (value) is evident
2. Everyone participates, not just a select few.
3. Everyone is capable of using the method.
4. Psychological needs are satisfied.

When learning any skill, we start out with something we can do and continue to increase its complexity at the same rate while mastering the components of the skill. For example, in learning tennis, we are taught first how to hold the racquet, then how to stand and move our feet, then how to move the racquet. Only then is a ball tossed our way so that we can hit it. But we are not expected to hit it hard; the important point is to make it go where we want it to go. Once we can do that, we slowly increase speed and power. JIT allows us to practice the skills on simple jobs to the point where our confidence allows us to use them on more sophisticated examples.

Since the time the TWI programs were developed, psychological research has explained why industry identified the three skills it did. As it turns out, these three skills represent the three needs that are basic to all humans. Two behavioral psychologists, Edward Deci and Richard Ryan, have developed what they refer to as self-determination theory (SDT; Pink, 2009, p. 70). Being interested in why people do what they do, they argue that there are three universal, psychological human needs:

1. Competence
2. Autonomy
3. Relatedness

When we satisfy these needs, we are motivated, productive, and happy. When those needs are not met, our motivation, productivity, and happiness are reduced. These needs apply to all people, no matter what they are doing. Competence is knowing how to do something. After analyzing a job using a JBS, people feel more confident doing that job even though they have been doing it for many years. Autonomy is having some control over what you are doing. Job Methods Training teaches people how to make improvements in what they do, thereby controlling their own work to some degree. Relatedness is being connected to and/or interacting with others—that is, not being alone. Although we may want to be with other people, everyone is an individual and at times this can cause problems. Job Relations Training teaches us how to deal with personnel situations.

Some people may discredit the TWI programs for their simplicity and age, but I prefer to justify their usefulness based on Ockham's razor, which states, in effect, that the simplest solutions are often the best. Everything we do involves a skill, and learning that skill is done best by beginning with its fundamental components. As complicated as our organizations and our jobs within those organizations are, everything can be broken down into simpler components. These include mechanical components such as shipping schedules, final products, work areas, machines, tools, inventory, and so forth. But they also include personal components such as beliefs,

emotions, and behaviors, to name a few. When addressed at a high level, mechanical and personal components (e.g., oil and water) may not mix well. When we view them through a TWI lens, however, we see and learn their commonalities.

TWI programs are continually being used after more than 70 years for that reason. People start using them because they improve the intended metrics of quality, productivity, cost, and safety. People will keep using them because they form a foundation of the mutual learning model. As good as this sounds, however, we must recognize that the TWI programs teach only fundamental skills and are thus just a place from which to start. However, a person who does not start on a firm foundation may never truly reach his or her stated objective and will forever be trying to catch up. On the other hand, because these programs do teach fundamental skills, we are less likely to oversell or misapply them, which is one reason they should last for another 70 years and be firmly entrenched in our nature.

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