



Minimizing Time to Experience and Maximizing Performance

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1. Background

It is generally recognized that industrial companies are in the midst of a human resource crisis. In a recent survey of industrial executives, each indicated that the aging workforce is one of their most difficult challenges. The average age of the industrial worker has been on the increase for decades. With a large segment of the industrial workforce on the verge of retirement, just about every aspect of every industrial operation is challenged with filling in positions with new talent without a significant drop off in productivity. This is particularly daunting since many of the jobs most affected are in skilled positions that normally require years of experience to reach desired levels of proficiency.

Fortunately, the sciences of human performance management, education and industrial technologies have advanced to the point that the “time to experience” of employees can be significantly reduced over traditional approaches. Even better, utilizing state-of-the-art approaches to human performance improvement, the performance of key personnel can not only rapidly grow to meet the needs of industrial operations facing huge personnel replacement challenges, but their performance can increase to new levels which are far beyond those traditionally possible.



2. Traditional Approach to Personnel Performance Management

One reason the aging of the industrial workforce has become such a crisis is that it has normally taken considerable time to evolve employees to proficiency at their jobs. When operational employees joined industrial organizations years ago, they were initially put through some kind of formal training program. Following initial training, they were then put on the job under the supervision of highly experienced workers, or work teams, so that the knowledge of these highly experienced workers could be slowly transferred to the less experienced employees. Over the years, the employees would progress in both experience and proficiency until they reached a level of efficiency and expertise, enabling them to transition into positions of leadership on their respective teams. Industrial jobs were so challenging and industrial operations so complex that it might take years or even decades for a worker to progress to the desired level.

The traditional progression of talent to proficiency works quite well if the workforce is continually comprised of a number of employees at different levels of progression. This provides a continual group of talent in position to take over as the more experienced talent leaves the workforce. Unfortunately, from the early 1990s to today, there have been fewer people entering the industrial workforce due to economic downturns, technological innovations that replaced headcount, and better work opportunities in other market sectors. Coupled with significant downsizing that accompanied the economic downturns, the result is a critical talent gap for many industrial companies. Many companies now have a large number of older, highly experienced personnel preparing to retire and a large number of relatively inexperienced workers not quite ready to take over the vacated responsibilities. Today, the traditional approach to bringing on and training inexperienced employees does not suffice.

3. Educational Sciences

Much educational design prior to the 1970s was focused on how to make lecture-style classroom training more effective. We often refer to this as academic education. In areas such as the natural sciences, classroom training was typically supplemented by more experientially-oriented training in the form of lab exercises. It has long been understood that there are certain things that are much better learned, understood and retained if the student can be exposed to the theory through a more academic classroom lecture approach and experience the results through experiential laboratories.

As I was taking graduate courses in education during the late 1970s, the educational community in the United States had just started to formally recognize the power of experiential education in areas other than the natural sciences. A number of the courses were set up to work through case studies as though the student was going through an actual, real world experience. The effectiveness of experiential programs for certain types of training was significantly better than a traditional classroom experience. A number of colleges and universities started introducing experience-based courses into their curriculum. As a result, the power of experience-based education to bring up a novice to a reasonable experience level for certain aspects of training started to become generally recognized.

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Today, the most effective results in human resource development typically involve an effective combination of academic and experiential training. The academic training is effective at communicating overall theory while the experiential training provides a more pragmatic perspective. The time to effectiveness of people encountering new work environments can often be significantly reduced through the effective combination of academic and experiential training approaches. Certainly the ultimate experiential training approach is direct on-the-job training. People grow in effectiveness at the highest rate when actually performing tasks on the job.



4. Minimizing Time to Experience in Industrial Environments through Simulation

Since industrial companies are facing a huge human resource experience gap issue, it has become absolutely essential, for the sustainable performance of these operations, to reduce the time to experience of new employees and workers who have been brought into the operations over the last five years. It has become clear that the most effective way to accomplish this is through a combination of academic, experiential and on-the-job training.



Although classroom training is critically important in setting the overall context of the plant operation and getting employees to understand the overall theory of operation, research has demonstrated that students retain less than 30% of what they are presented in this manner. Instructors are typically trained to go over important points and issues at least three separate times during the classroom sessions in order to get to the 30% level. You might hear instructors repeat the adage to “tell them what you are going to say, say it, then tell them what you said” to get the three repetitions. Although this is good instructional methodology, it still only gets the students to a basic level of comprehension.

Experiential training approaches provide a higher level of retention than academic approaches, and are even more effective if they are used as a follow-on to a classroom session. Employees can immediately put the knowledge they have gained in the classroom to practice – thus reinforcing what they had learned to increase retention and adding to what they had learned to further drive to effectiveness.

Unfortunately, many industrial processes are significantly negatively impacted through inexperienced operations and maintenance teams. Plant management is justifiably reluctant to allow inexperienced operations personnel to get the level of live on-the-job experiential training required to truly reduce their time to effectiveness. The solution to this is “near-time experiential training” using training simulators or even virtual reality systems. Training simulators are available today at multiple levels of sophistication from simple process loop simulators all the way to full rigorous first principle model simulations of the entire plant. Very effective training can be done with all levels of simulation to give operations personnel firsthand experience to multiple levels of detail. Full rigorous, first principle model simulators allow operators to experience a simulation which is as close to a real plant operating environment as possible. Instructors can help operators walk through what would be extremely dangerous situations in the plant, but with the simulator they can learn to effectively respond in a safe environment. This near-time experiential approach to training can significantly reduce the time to experience for operators by enabling them to learn through a hands-on approach to deal with both normal operational situations as well as exceptional and abnormal situations that only occur infrequently in live plant operations.



Recently, there has been a major breakthrough in the area of near-time experiential training with the introduction of low-cost virtual reality interfaces to rigorous, first principle model simulators. These virtual reality systems enable operations and maintenance personnel to engage in highly effective, yet safe, immersive training environments that are incredibly true to live plant operations. These immersive training systems, when effectively deployed and used in conjunction with training simulators and classroom approaches, can significantly reduce the time to experience for operations and maintenance personnel, and help close the experience gap that is plaguing industry.

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5. Beyond Time to Experience – Continuous Performance Improvement

Closing the experience gap is absolutely essential to the effective operation of industrial plants, especially as the departure of the present aging workforce continues to accelerate. Closing the experience gap however, will only sustain operations at the same levels that they are achieving today. Plant business performance must improve or it will become increasingly difficult to compete in industrial markets that are rapidly becoming commoditized.

Again, technological advances have provided an ideal solution for driving continuous profitability improvement from industrial assets. It has been commonly accepted for decades that on-the-job training (OJT) is critically effective, but most traditional OJT approaches involve a highly experienced worker supervising the behavior of less experienced workers. Although this has been adequate, it is constrained by only allowing the less experienced workers to get to the experience level and efficiency of their mentors.

Recent advances in the areas of real-time Key Performance Indicators (KPIs), real-time accounting, real-time workflow management, and real-time contextualized business intelligence are providing environments in which automatic, electronically produced information on the operations and financial performance of the enterprise is available, and accessible to every person in the operation. Whether they are a stationary worker at a traditional workstation or a remote worker using a mobile wireless unit, real-time operations intelligence can be provided in a format commensurate with each person's experience, training and capability. The resulting real-time "dashboards" or "scorecards" provide an online, real-time performance training environment for any person who has the potential to impact the operational or financial performance of the plant.

With this immediate performance feedback, each person can assess the performance impact of their actions, immediately after the actions are taken. For example, a common activity of a process operator may be to adjust a temperature. Traditionally they just hoped that the new temperature was a good idea. With real-time performance feedback they can immediately discern if the change added or detracted value. Over time, they will learn how to perform their actions in a manner that continually creates the most value of the operation.

Experience with real-time OJT performance can drive both the operational and financial performance delivered by every person to measurable and previously unattainable levels. In fact, on average this type of training realizes a 100% return on investment within three months.

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Sustainable, measurable performance improvements come from a combination of training approaches geared to minimizing time to efficiency, then driving to new levels of operational and financial performance (Figure 1).

The exact combination will be different for each industrial organization and will depend on current experience, training level and complexity of the operation.

Consultants familiar with both state-of-the-art training approaches and the needs of industrial operations can help design the program that specifically meets the needs of each operation.



Figure 1

Every effective program should be looked at as an continuous integral part of an industrial operation rather than a “training event”. The goals and objectives should be clearly set to:

- Ensure there is an effective approach to minimize the impact of the experience gap in the organization
- Drive continuous performance improvement of the operation

Figure 2 represents the impact of traditional training approaches (blue line) and illustrates the potential positive impact that an effective approach to training can have on time to experience.

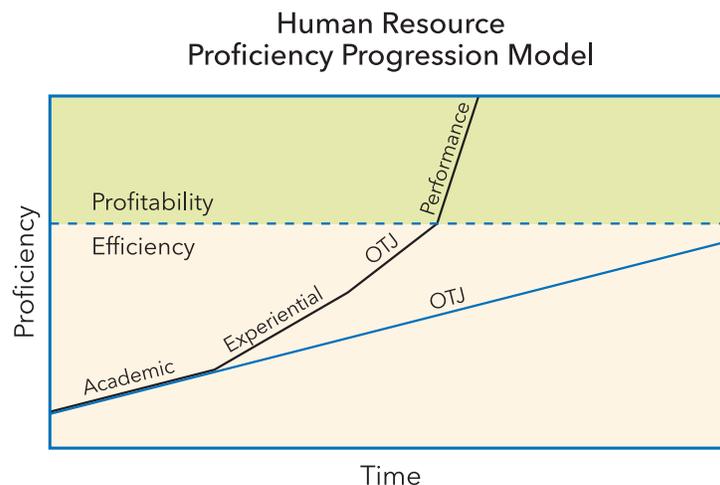


Figure 2

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6. Conclusion

The aging of the workforce and the growing number of experienced industrial personnel ready to retire over the next few years, coupled with the gap in experience of the remaining workforce, is creating a crisis for industrial operations. As highly experienced personnel are retiring, the remaining workforce is not at an adequate level of proficiency to take over operations. A new approach, based on state-of-the-art training approaches and technological capabilities, is now available to both minimize time to efficiency and drive incremental continuous operational and financial performance improvements.

The Invensys Business Value Solutions team can design a solution that meets the needs of any industrial organization experiencing this gap. The Invensys approach is not only starting to reap benefits in terms of raising the overall experience level to fill the gap left by retirements, it is also helping to drive measurably increased profitability through better human performance management, resulting in 100% returns within three months.

If the experience gap is a problem in your operation, or if you would like to drive more performance from your current workforce, it may be time to engage the Business Value Solutions team – from Invensys. Find out more on our website at iom.invensys.com.



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