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Implementing Workplace Learning Systems An Innovative Case History at Boeing

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Abstract

This chapter describes an initiative in Boeing's Commercial Airplane Group to move from conventional classroom and lab training to a learning system at the work site called Workplace Learning Systems. A Workplace Learning System puts the local managers and workforce in control of their own learning, integrates all forms of formal and informal learning, and ties learning to measurable business performance.

We outline the general concept and features of Workplace Learning Systems and tell the story about how this concept was born in a long-range Training & Development (T&D) strategy. A persuasive business case was part of this strategy and served to enroll executive support and sponsorship. We will tell you later in the story which parts of the business case proved valid and which did not.

We describe the intervention process that was used to implement Workplace Learning Systems. This process is an intervention by a team of performance consultants, instructional designers, trainees, and project managers. It is a systematic process that can be replicated in almost any workplace situation.

We describe in some detail specific applications in two areas of Boeing; Payloads engineering and Wings manufacturing. These specific applications show how the Workplace Learning Systems concept can be adaptively applied in radically different work environments and describe dramatic results obtained such as productivity gains, error and defect reductions, and reduced cost of training.

Finally, we'll summarize the lessons learned and make a few predictions about the road ahead.

The Story Begins

The Boeing Commercial Airplane Group designs, makes, sells, and services the commercial airliners we are all familiar with; in particular the 727, 737, 747, 757, 767, and 777 series of airplanes for airlines around the globe.

Our story begins in 1997 when Boeing Commercial Airplane Group was ramping up to meet increasing demand and hiring thousands of workers. At the same time, the company was introducing major change in engineering and manufacturing methodology and technology. In addition, much of the front line leadership workforce was new to management. All these factors added up to an enormous collection of training and development needs.

The Training and Development Department had been recently recentralized and needed a long-term strategy to focus their resources on the most important business goals.

Boeing Commercial Airplane Group contracted with SWI Consulting, Inc. to develop with them a 10 Year Training & Development Strategy to cope with these multi-varied training needs. The Boeing Commercial Airplane Group workforce at the beginning of the story was at approximately 62,000 people and grew to 94,000 people in 18 months. One of the challenges faced by the T&D Strategy was coping with the typical airplane industry business cycle where employment goes up and down by roughly 30% in two- to three-year cycles. The Training and Development effort had been largely conventional classroom training. This meant that the instructor workforce cycle was a greatly magnified version of the Boeing Commercial Airplane Group workforce cycle since there is so much training to be done to qualify a new worker in this industry. A 30 percent swing in the overall workforce can result in a two-to-one swing in the instructor workforce. At one point during the up cycle, there were more than 100 open positions for instructors.

A central T&D strategy that emerged was a deliberate shift away from centralized classroom training toward self-paced learning at the work site. The idea here is to have individual workers learning just what they need, just in time for the actual work they are expected to do. Individualized learning could take place using computer-based training modules, self-instructional conventional materials, coaching by others in the workplace, and other forms of informal learning. Each worker would have a learning plan tied to their job and would be expected to complete their learning objectives with support from the learning system, including supervisors, coaches, learning materials, etc.

Boeing Commercial Airplane Group in Early 1997

- Grew from 62,000 to 94,000 employees in 18 months
- Business challenges included
 - Major ramp-up in airplane production rates
 - Hiring and qualification of thousands of workers
 - Major process re-engineering
 - Applications of new technology
 - Acquisition of McDonnell Douglas and five Rockwell Divisions

Employee Training and Development (ET&D) in Early 1997

- Had been decentralized and recentralized
- 182-430 employees in ET&D in 18 months
- Mix of T&D services
- Classroom delivery focus
- Morale issues
- Reactive versus proactive approach
- “People Strategy” backdrop
- Rising demand for services
- Issues with credibility/reputation

The business case for making this shift from conventional classroom training to workplace learning included the following elements:

Business Case Summary		
Actions	Cost	Benefit
<ul style="list-style-type: none"> • Shift to individualized-modular delivery • Move training toward the workplace • Implement the entire BCAG learning system concept 	<ul style="list-style-type: none"> • Invest more in learningware development • Invest in workplace learning system 	<ul style="list-style-type: none"> • Net savings up to \$50 or \$60 million/year by 2002 <ul style="list-style-type: none"> - Worker training time - Worker travel time - Training staff • Improved timeliness and quality of learning • Better fit between job requirements, individual needs, and training received

The Workplace Learning System initiative was launched in late 1997. Four very different work environments were chosen as pilot projects to validate the workability of the concept and prove the value through measured business results. Executive sponsors on the Boeing Commercial Airplane Group Leadership Team were asked to help select the pilot applications and to provide executive-level support throughout the project. The four pilot projects included

- Engineering – Payloads (interior configuration of the airplane)
- Manufacturing – Wings (wing assembly)
- Customer Service – Customer service representatives (global interfaces with airline customers on technical issues)
- Human Resources – Compensation specialists

The Employee Training and Development Department created a Master Team with subteams to proceed with each of the four pilots. These resources included

- Manager of Workplace Learning Systems
- Overall project manager
- Per project
 - One performance consultant, full-time
 - One project manager
 - Instructional designers, as needed
 - Instructors, as needed

SWI Consulting worked with this Master Team to develop the intervention process and specific responsibilities for each role.

Our story will feature two of the pilot projects, engineering and manufacturing, to illustrate different applications of the Workplace Learning Systems concept, but we will offer lessons learned from all four pilots.

Before we get into the specific pilot applications, let's review in a little more detail the overall Workplace Learning Systems concept and features and describe the intervention process that was used to plan and install an application.

What is a Workplace Learning System?

The following definitions help explain some of the concepts we will be using.

- *Workplace Learning System* – A Workplace Learning System is an organized way for the people in a *workplace* to manage individual and group learning in a way that
 - Meets work performance needs
 - Meets career and organizational development needs
 - Takes advantage of resources within the workplace and outside of it
- *Workplace* – Let's clarify what we mean by *workplace*. For our purposes, a *workplace* is some work community that shares a set of common learning needs and performance requirements. Examples might include
 - A production area in a manufacturing plant
 - Design engineers
 - A regional sales office
 - The headquarters marketing staff
 - A Product Team
 - A customer service group
- *Learning* – Learning is the acquisition of a new response capability. At the individual level, this can include learning new vocabulary, concepts, and tasks; new ways of doing an old task; and physical, intellectual, or interpersonal skills. At the workgroup and organizational levels, this can include new ways of working within the group, new ways of working across group boundaries, changes in group cultural values and decision patterns, and the like. Much learning occurs naturally in the context of doing work.

What is a Workplace Learning System?

A systems approach to meeting the learning needs of a work community with common performance requirements

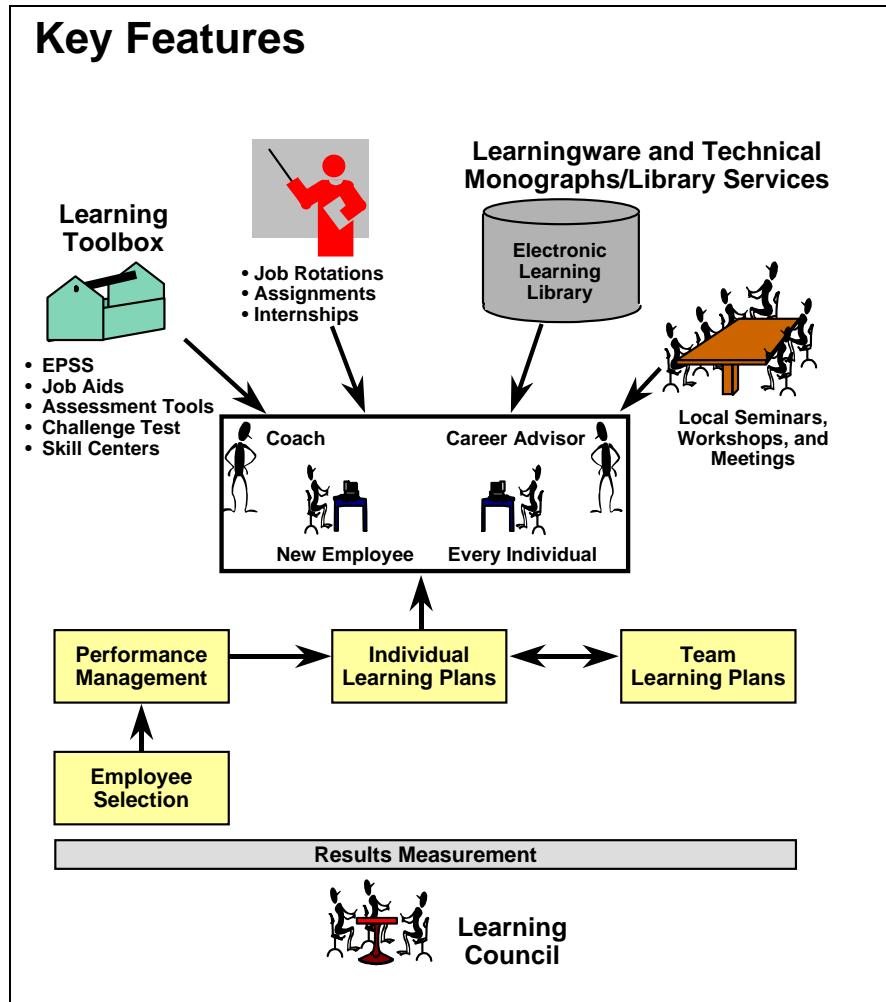
- **Managed and controlled by the workplace community**
- **Uses a combination of local and non-local resources**
- **Takes advantage of a variety of formal and informal ways of learning**

- *Development* – Development is the longer-term integration of learning into individual competencies and organizational capabilities. At the individual level, this can include competencies such as leadership, large-scale project management, technology forecasting, etc. At the workgroup level, this can include capabilities like process management, continuous process improvement, and technical innovation. At the organization level, examples might include capabilities such as opening new global markets, lean production, product portfolio management, and so forth.

Key Features

Key features of a Workplace Learning System may include

- Individual learning and development plans that are tied to individual work assignments through performance management
- Team and workgroup development plans that are tied to workplace business goals
- Extensive use of alternative delivery methodologies (e.g., CD-Rom and web-based training)
- Coaches/mentors who guide learning and provide the link to job performance
- Individuals and coaches/mentors who are jointly accountable for learning results
- Workplace Learning Council that
 - Appoints mentors/coaches
 - Creates team development plans
 - Identifies learning and development needs
 - Prioritizes development of learning resources
 - Reviews results
- Links to company and outside training and education resources such as
 - Electronic access to information
 - Electronic delivery of instruction
 - Attendance at learning events
 - Integration with functional or leadership curricula
 - Knowledge management systems
- Local management that has been given the tools to develop the local talent pool and important organizational capabilities
- T&D department that provides
 - Start-up consulting support
 - Development of instructional materials
 - Ongoing training and support services



Principles and Concepts of Workplace Learning Systems

The following items summarize some of the key principles and concepts of Workplace Learning Systems:

- The focus is on learning needed to do specific tasks.
- Individual learning plans and schedule are tied to work assignments.
- Individualized self-paced learning takes less time than classroom instruction.
- Learning transfers to real work performance.
 - It is tied to the work.
 - The coaches/mentors are part of the workplace.
- Informal learning opportunities are maximized.
- Materials and resources are used systematically.
 - Job-related references and manuals; company and outside
 - Job aids
 - Training/learning materials
 - Company and outside training and education programs
- Management and learners jointly decide on learning goals.

- Management is in control of the learning needed to achieve critical business performance.

The Intervention Process

The intervention process is a standard systems intervention process with five major phases. Designing and implementing a Workplace Learning System requires a project approach. Each application involves creating a specific project using this process. Then, work through the phases listed below to ensure a successful project.

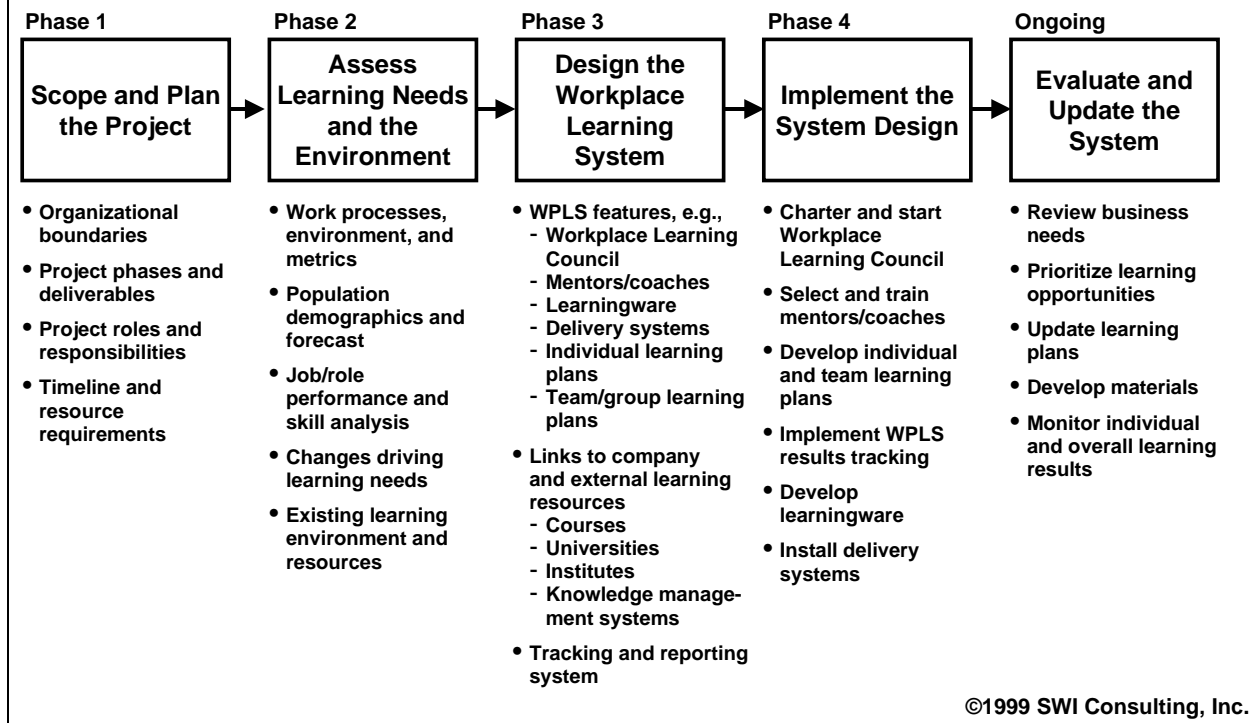
- Scope and plan the project.
- Assess learning needs driven by business requirements.
- Assess the local learning environment.
- Design the Workplace Learning System.
- Implement the system design.
- Evaluate and update the system.

Designing and installing a Workplace Learning System for a specific workgroup takes more than making a presentation to management and tossing an instruction set over the wall to them.

A successful implementation requires a well-designed project that is planned and conducted as a partnership between local management and the T&D group. T&D brings analysis and design skills as well as a deep understanding about how to organize learning to get real work performance. Local management understands the work and the needs of their business. They also have control of workplace resources.

The intervention process is a combination of the five phases and their outputs as shown below and defined roles and responsibilities. The chart below shows the phases with the bullets indicating the primary outputs for each phase. As you will see in the two case studies, this process gets adapted to meet the needs of each project.

Workplace Learning System Project Template



Some of the key roles in the intervention process are

- Workplace learning manager
- Project coordinator
- T&D customer account representative
- Performance consultant
- Instructional designer
- Instructors
- Executive sponsor
- Management Team (customer)
- Working Team
- Other key resources.

The responsibilities for these roles are summarized below.

Workplace Learning Manager

- Negotiate scope and project plan with customer organizations and customer account representative.
- Staff the project and obtain other resources and arrange for needed training.
- Briefing, education, and coaching of the customer management.
- Review and critique all project plans.
- Track project performance and troubleshoot.
- Liaison with Customer Management Team and customer account representative.
- Document lessons learned and update the process documentation.
- Orchestrate the milestone reviews.
- Orchestrate sponsor involvement.

Project Coordinator

- Maintain activity network diagram.
- Maintain schedule.
- Maintain process tracking and visibility.
- Maintain resource records and time tracking.
- Produce project status reports.
- Organize and archive project outputs including lessons learned.

T&D Customer Account Representative

- Negotiate scope and project plan with customer organizations and workplace learning manager.
- Ensure linkage to customer business strategy.
- Represent customer interests to T&D department.
- Support workplace learning manager.
- Briefing, educating, and coaching customer management.
- Linkage to account master plan and T&D processes, systems, and plans.
- Orchestrate the milestone reviews.
- Orchestrate sponsor involvement.

Performance Consultant

- Serve as project manager.
- Detail the project plan content.
- Carry primary analysis work in analysis phase.
- Facilitate Working Teams (subject matter expert interface) through analysis and design phase.
- Create design concepts and templates.
- Consult to development and implement phase.

Instructional Designer

- Create design concepts and templates.
- Project manage development pilot.
- Detailed design during development.

Instructors

- Help identify and assess existing learningware.
- Critique design.
- Possible implementation support.
- Train and qualify line instructors, coaches, and facilitators.
- Participate in learningware development.
- Play the role of mentor/coach during training intervention.

Executive Sponsor

- Select area to be addressed.
- Set expectations to Management Team and Working Team.
- Concur in project scope and plan.
- Remove roadblocks.
- Ongoing support for staying the course through implementation.
- Represent the project to the Governance Network.

Management Team

- Negotiate scope and project plan with workplace learning manager and customer account representative.
- Staff Working Team and identify other support resources.
- Review and approve milestone outputs.
- Appoint key roles per the design.
- Support implementation and ongoing operation.

Working Team

- Represent the affected workforce.
- Perform specific tasks during each phase, directed/facilitated by the performance consultant or instructional designer.
- Advocate the design to the Management Team and workforce.
- Actively participate in implementation.

In actual practice, as you'll see in the Boeing Payloads and Wings examples, parts of Phases 2, 3, and 4 may be going on simultaneously and/or be applied repetitively to different aspects of the workplace work system.

The “Payloads” Example

The “Payloads” work centers are a part of the “Define” process in Boeing where engineering design is done on the airplane. The people in Payloads use sophisticated computer-aided design tools to custom engineer everything that goes inside the airplane except the cockpit. This includes

- Seating
- Overhead racks
- Galleys
- Lavatories
- Cargo bays
- Etc.

Each customer order contains different specifications so the Payloads design is an ongoing process for any model airplane still in production.

The Payloads organization has five design groups, each with about 400 people. At the beginning of the Workplace Learning System pilot, they were experiencing an annual turnover of about 25 percent, which meant hiring and training approximately 500 new people per year just to stay even. The basic conventional computer-aided design training for each new person was twenty-four to thirty-two days. A new server-based computer-aided design system was about to be installed replacing the older mainframe system and offering many new or different features and tools for completing the work.

The Engagement

At the time the ET&D Workplace Learning Team was ready to engage, the Payloads organization had its own Process Integration Group working to implement the new server-based system and make improvements in the overall work processes including the way support groups like training are used.

This Process Integration Group became the Workplace Learning Council for Payloads and served as a focal point to guide and direct the Workplace Learning System interventions.

Two separate interventions were planned and executed.

1. The System Implementation Intervention – Provide learning support for the implementation of the new server-based computer-aided design system.
2. The Productivity Improvement Intervention – Provide learning support for general productivity improvement.

The System Implementation Intervention

The traditional method of implementing a major new design system was to

- Distribute new workstations across the many design groups, as they became available.
- Send the designers off to a general training session on the new system at the training center.

The results of this approach were that training could not be specific to an individual design group, the group was not trained together, and there was no real reinforcement. So the designers often as not relied on the old system which was still available through their new workstation.

The Workplace Learning System Team and Process Integration Group changed this process so that

- Each design group was converted to the new system as a whole on a single day.
- The designers attended a full day of emersion training while their own design center was being converted.
- The training was customized to their specific design tasks.
- Technical coaches attended the training and then spent the next week at the design center helping the designers come up to speed using the new system on their own work.

The net result of this approach was that

- Immediate utilization rates for the new system over the old were 50 percent higher in the Workplace Learning System groups than in control groups, which followed the traditional implementation approach.
- The technical coaches were able to create specific job aids for each group to help with common problems during their post-class coaching week.
- The coaches and designers together were able to isolate systems problems and raise them to awareness of the System Implementation Team.

The company now believes the methodologies used in this intervention will become the standard for any process, tool, or technology implementation in the future.

The Productivity Improvement Intervention

The second Payloads intervention focused on improving work performance. The team asked the Payloads managers, “what factors in your performance metrics would be most valuable to improve?” The answer was “changes, errors, and rework”. Up to two thirds of design time was being spent correcting problems that could have been eliminated if the work had met specifications the first time. The design time cost of these errors was only a fraction of the real cost because of the consequences to the workgroups downstream of design in the production process; the farther downstream the error gets before it is caught, the more costly it is to correct it. Coping with errors and rework increases the cycle time for all work going through the design center. The traditional approach to cutting cycle time is to add headcount.

The approach taken by the Workplace Learning System Team was to work with specific design teams to

- Analyze the errors.
- Isolate the steps in the design process where the errors were taking place.
- Find or develop the training modules for the specific design tools needed; usually buried in weeks-long conventional courses.
- Extract the training modules needed.
- Apply the training on-the-job using technical coaches.
- Capture lessons learned in a knowledge databank for future application.

Some discoveries and results of this intervention include

- Up to 200 percent measured productivity increase.
- Some of the highest leverage computer design tools had been going unused because the designers were unaware of specific applications to their work packages.
- Eighty percent reduction in training cost by using highly focused, modular on-the-job coaching
- The cost to the training department went up 20 percent and was more than offset by the savings of the designers' time away from their work.
- Coaching Teams helped level out performance during a time of organizational turmoil with minimal disruption to the work group.
- Getting started in each case required gaining trust of the designers who were afraid to admit their own problems or reluctant to share their best methods.

The overall experience in Payloads was very positive and is creating a demand for extended Workplace Learning Systems support for *both* productivity improvement and new technology implementation.

The “Wings” Example

The “Wing Responsibility Centers” are a business within the business. They design, make, and supply wings for all the airplane programs. The Workplace Learning System pilot took place in the Renton Wing Responsibility Center that supplies wings for the 737 and 757 model airplanes. It employs about 700 people including engineers, production people, tooling, quality control, etc.

The Intervention

The Workplace Learning System Team entered the Wing Responsibility Center at vice president-level. The VP selected Renton as the pilot site, and a director was engaged to establish a Workplace Learning Council.

The first effort the Council chose was aimed at worker FAA certification, which was determined not to be an economical application of the Workplace Learning Systems concept. The second approach tried by the Workplace Learning System Council was to focus on defect reduction. The Workplace Learning Team was given access to the organization's defect database (a major breakthrough) and used the following approach:

- Select workgroups with higher than average defect rates.
- Develop a Working Team in each group.
- Analyze the causes of specific defects to determine which of them are caused in whole or in part by skills and knowledge.
- Identify the specific workers who need skills development.
- Coach specific workers on specific skills to reduce specific defects.

Somewhat surprisingly, the workgroups right down to individual workers welcomed the help. The cost of defects dropped from 75 percent to 100 percent in most cases!

Returns on investment data are still in process, but there is general consensus that

- Defects and cost of defects are down dramatically.
- Training time and training costs are down.
- The value added far exceeds the cost.

A sidebar comment is that an interesting collaborative effort with the Union came about during this project. The Union is working to identify skills and knowledge required for each job code and to evolve ways to qualify its people and help them to manage their career mobility from job to job. This project was an assist to them in their effort. The “lead” production people who are Union employees also became the technical coaches, providing the on-the-job technical skills training to others. This responsibility, fortunately, was already part of their job description as a “lead”. This project gave them a structure to follow.

One of the important conclusions is that the Employee Training and Development Department cannot staff up to support this type of effort across all production organizations unless in-place staff are trained and charged with doing much of the ongoing work. To this end

- Industrial engineers were trained to analyze defects for skills and knowledge problems and to develop training-type job aids.
- The “leads” were trained to work as technical coaches.
- The “career advisor” was helped to use the results with individuals in their career planning.
- Knowledge sharing was established across workgroups via the Workplace Learning Council.

With an embedded support group in place, the training department teams are free to move from work center to work center installing the concept without having to leave a small army of their own staff in place to support it.

Lessons Learned from All the Boeing Pilots

1. The systematic approach focused on actual work performance and delivering learning at the work site is effective and pays big dividends.
2. This type of learning system requires a mindset change for both the customers and the training department. It is very different from conventional training and requires much more intimacy between trainers and their customers.
3. The Customer Management Team must be committed at all levels.
4. The training department must provide support by putting performance consultants and technical instructors in the field and by carving up traditional courses into bite-sized modules and job aids usable for highly focused learning at the work site.
5. Communication is critical; it’s easy for people to lose track of what is going on, why its being done, and what is coming out of it.
6. The Workplace Learning Systems initiatives become a magnet for integrating the efforts of other support organizations such as industrial engineering, quality assurance, and computing to help improve work performance.

7. This is a very useful tool for introducing new technology and for getting a high, early return on the investment in technology.
8. The more knowledge the Workplace Learning Team has of the work being performed by the learners, the more easily they will be accepted and the more effectively they will contribute solutions.

A bottom line conclusion by the Boeing Team is that this approach converts the training department from a deliverer of training to a provider of learning products and services that allow their customers to do their job better.

Future Prospects

The success of the Workplace Learning System pilot projects has led the Boeing Team to begin planning for wider deployment. Some of the critical factors in the wider deployment will be

- Engaging senior management in the deployment strategy.
- Acceptance that extra training department resources are needed at the start in order to get the big returns later.
- Acceptance by the training department of a different way of doing business and a different way of deploying their resources.
- Working hard to integrate with other efforts to improve performance and claiming only a fair share of the results for the learning component.
- Building in knowledge management to share learning across work centers.

Boeing's experience innovating a new approach to learning makes the term the "learning organization" come a large step closer to reality. Hopefully others will learn from their effort and embark on a similar transformation away from heavy reliance on traditional training.

Questions for Discussion

1. What is the real innovation represented by this case?
2. What situations are you familiar with would this Workplace Learning System have high pay-off?
3. What resistance factors would you face if you attempted to implement or even try out this concept?
4. What implementation resources or skill sets is your organization missing, e.g., performance consulting?
5. How would you go about selling a pilot application?

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