BUILDING A LEARNING ORGANIZATION

Continuous improvement programs are sprouting up all over as organizations strive to better themselves and gain an edge. The topic list is long and varied, and sometimes it seems as though a program a month is neededjust to keep up. Unfortunately, failed programs far outnumber successes, and improvement rates remain distressingly low. Why? Because most companies have failed to grasp a basic truth. Continuous improvement requires acommitment to learning.

How can an organization improve without first learning something new? Solving a problem, introducing a product, and reengineering a process all require seeing the world in a new light and acting accordingly. In the absence of learning, companies—and individuals—simply repeat old practices. Change remains cosmetic, and improvements are either fortuitous or short-lived.

A few farsighted executives—Ray Stata of Analog Devices, Gordon Forward of Chaparral Steel, Paul Allaire of Xerox— have recognized the link between learning and continuous improvement and have begun to refocus their companies around it. Scholars too have jumped on the bandwagon, beating the drum for "learning organizations" and "knowledge-creating companies." In rapidly changing businesses like semiconductors and consumer electronics, these ideas are fast taking hold. Yet despite the encouraging signs, the topic in large part remains murky, confused, and difficult to penetrate.

Meaning, Management, and Measurement

Scholars are partly to blame. Their discussions of learning organizations have often been reverential and utopian, filled with near mystical terminology. Paradise, they would have you believe, is just around the corner. Peter Senge, who popularized learning organizations in his book *The Fifth Discipline*, described them as places "where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together."[1] To achieve these ends, Senge suggested the use of five "component technologies": systems thinking, personal mastery, mental models, shared vision, and team learning. In a similar spirit, Ikujiro Nonaka characterized knowledge-creating companies as places where "inventing new knowledge is not a specialized activity…it is a way of behaving, indeed, a way of being, in which everyone is a knowledge worker."[2] Nonaka suggested that companies use metaphors and organizational redundancy to focus thinking, encourage dialogue, and make tacit, instinctively understood ideas explicit.

Sound idyllic? Absolutely. Desirable? Without question. But does it provide a framework for action?Hardly. The recommendations are far too abstract, and too many questions remain unanswered. How, for example, will managersknow when their companies have become learning organizations? What concrete changes in behavior are required?

What policies and programs must be in place? How do you get from here to there?

Most discussions of learning organizations finesse these issues. Their focus is high philosophy and grand themes, sweeping metaphors rather than the gritty details of practice. Three critical issues are left unresolved; yet each is essential for effective implementation. First is the question of *meaning*.

We need a plausible, well-grounded definition oflearning organizations; it must be actionable and easy to apply. Second is the question of *management*. We need clearer guidelines for practice, filled with operational advice rather than high aspirations. And third is the question of *measurement*. We need better tools for assessing an organization's rate and level of learning to ensure that gains have in fact been made.

Once these "three Ms" are addressed, managers will have a firmer foundation for launching learning organizations. Without this groundwork, progress is unlikely, and for the simplest of reasons. For learning to become a meaningfulcorporate goal, it must first be understood.

What Is a Learning Organization?

Surprisingly, a clear definition of learning has proved to be elusive over the years. Organizational theorists have studied learning for a long time; the accompanying quotations suggest that there is still considerable disagreement (see the insert "Definitions of Organizational Learning"). Most scholars view organizational learning as a process that unfolds over time and link it with knowledge acquisition and improved performance. But they differ on other important matters.

Some, for example, believe that behavioral change is required for learning; others insist that new ways of thinking are enough. Some cite information processing as the mechanism through which learning takes place; otherspropose shared insights, organizational routines, even memory. And some think that organizational learning is common, while others believe that flawed, self-serving interpretations are the norm.

How can we discern among this cacophony of voices yetbuild on earlier insights?
As a first step, consider the Following definition:

A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and atmodifying its behavior to reflect new knowledge and insights.

This definition begins with a simple truth: new ideas are essential if learning is to take place. Sometimes they are created de novo, through flashes of insight or creativity; atother times they arrive from outside the organization or arecommunicated by knowledgeable insiders. Whatever their source, these ideas are the trigger for organizational improvement. But they cannot by themselves create a learning organization. *Without accompanying changes in theway that work gets done, only the potential for improvement exists.*

This is a surprisingly stringent test for it rules out a number of obvious candidates for learning organizations. Many universities fail to qualify, as do many consulting firms. Even General Motors, despite its recent efforts to improve performance, is found wanting. All of these organizations have been effective at creating or acquiring new knowledge but notably less successful in applying that knowledge to their own activities. Total quality management, for example, isnow taught at many business schools, yet the number using it to guide their own decision making is very small.
Organizational consultants advise clients on social dynamics and small-group behavior but are notorious for their owninfighting and factionalism. And GM, with a few exceptions (like Saturn and NUMMI), has had little success in revamping its manufacturing practices, even though its managers are experts on lean manufacturing, JIT production, and the requirements for improved quality of work life.

Organizations that do pass the definitional test—Honda, Corning, and General Electric come quickly to mind—have, by contrast, become adept at translating new knowledge into new ways of behaving. These companies actively manage thelearning process to ensure that it occurs by design rather than by chance. Distinctive policies and practices are responsible for their success; they form the building blocks of learning organizations.

Building Blocks

Learning organizations are skilled at five main activities: systematic problem solving, experimentation with new approaches, learning from their own experience and past history, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organization. Each is accompanied by a distinctive mind-set, tool kit, and pattern of behavior. Many companies practice these activities to some degree. But few are consistently successful because they rely largely on happenstance and isolated examples. By creating systems andprocesses that support these activities and integrate them into the fabric of daily operations, companies can manage their learning more effectively.

1. Systematic problem solving

This first activity rests heavily on the philosophy and methods of the quality movement. Its underlying ideas, nowwidely accepted, include:

- Relying on the scientific method, rather than guesswork, for diagnosing problems (what Deming calls the "Plan, Do,Check, Act" cycle, and others refer to as "hypothesis-generating, hypothesis-testing" techniques).

- Insisting on data, rather than assumptions, as background for decision making (what quality practitioners call "fact-based management").

- Using simple statistical tools (histograms, Pareto charts, correlations, cause-and-effect diagrams) to organize data anddraw inferences.

Most training programs focus primarily on problem-solving techniques, using exercises and practical examples. These tools are relatively straightforward and easily communicated; the necessary mind-set, however, is more difficult to establish. Accuracy and precision are essential for learning. Employees must therefore become more disciplined in theirthinking and more attentive to details. They must continually ask, "How do we know that's true?", recognizing that close enough is not good enough if real learning is to take place. They must push beyond obvious symptoms to assess underlying causes, often collecting evidence when conventional wisdom says it is unnecessary. Otherwise, the organization will remain a prisoner of "gut facts" and sloppy reasoning, and learning will be stifled.

Xerox has mastered this approach on a company-wide scale. In 1983, senior managers launched the company's Leadership Through Quality initiative; since then, all employees have been trained in small-group activities and problem-solving techniques. Today a six-step process is used for virtually all decisions (see the insert "Xerox's Problem-Solving Process"). Employees are provided with tools in four areas: generating ideas and collecting information (brainstorming, interviewing, surveying); reaching consensus (list reduction, rating forms, weighted voting); analyzing and displaying data (cause-and-effect diagrams, force-field analysis); and planning actions (flow charts, Gantt charts). They then practice these tools during training sessions that last several days. Training is presented in "family groups," members of the same department or business-unit team, and the tools are applied to real problems facing the group. Theresult of this process has been a common vocabulary and a consistent, companywide approach to problem solving. Once employees have been trained, they are expected to use the techniques at all meetings, and no topic is off-limits. When a high-level group was formed to review Xerox's organizational structure and suggest alternatives, it employed the very same process and tools.[3]

Xerox's Problem-Solving Process

Step	Question to Be Answered	Expansion/ Divergence	Contraction/ Convergence	What's Needed to Go to the Next Step
1. Identify and select problem	What do we want to change?	Lots of problems for consideration	One problem statement, one "desired state" agreed upon	Identification of the gap "Desired state" described in observable terms
2. Analyze problem	What's preventing us from reaching the "desired state"?	Lots of potential causes identified	Key cause(s) identified and verified	Key cause(s) documented and ranked
3. Generate potential solutions	How *could* we make the change?	Lots of ideas on how to solve the problem	Potential solutions clarified	Solution list
4. Select and plan the solution	What's the *best* way to do it?	Lots of criteria for evaluating potential solutions Lots of ideas on how to implement and evaluate the selected solution	Criteria to use for evaluating solution agreed upon Implementation and evaluation plans agreed upon	Plan for making and monitoring the change Measurement criteria to evaluate solution effectiveness
5. Implement the solution	Are we following the plan?		Implementation of agreed-on contingency plans (if necessary)	Solution in place
6. Evaluate the solution	How well did it work?		Effectiveness of solution agreed upon Continuing problems (if any) identified	Verification that the problem is solved, or Agreement to address continuing problems

Xerox's Problem-Solving Process

2. Experimentation

This activity involves the systematic searching for and testing of new knowledge. Using the scientific method is essential, and there are obvious parallels to systematic problem solving. But unlike problem solving, experimentation isusually motivated by opportunity and expanding horizons, not by current difficulties. It takes two main forms: ongoing programs and one-of-a-kind demonstration projects.

Ongoing programs normally involve a continuing series of small experiments, designed to produce incremental gains in knowledge. They are the mainstay of most continuous improvement programs and are especially common on the shop floor. Corning, for example, experiments continually with diverse raw materials and new formulations to increase yieldsand provide better grades of glass. Allegheny Ludlum, a specialty steelmaker, regularly examines new rolling methods and improved technologies to raise productivity and reduce costs.

> **Opportunity motivates experimentation. Corning, forexample, continually strives to increase yields and provide better grades of glass.**

Successful ongoing programs share several characteristics. First, they work hard to ensure a steady flow of new ideas, even if they must be imported from outside the organization. Chaparral Steel sends its first-line supervisors on sabbaticals around the globe, where they visit academic and industry leaders, develop an understanding of new workpractices and technologies, then bring what they've learned back to the company and apply it to daily operations. In large part as a result of these initiatives, Chaparral is one of the five lowest cost steel plants in the world. GE's Impact Program originally sent manufacturing managers to Japan to study factory innovations, such as quality circles and kanban cards, and then apply them in their own organizations; today Europe is the destination, and productivity improvement practices the target. The program is one reason GE has recorded productivity gains averaging nearly 5%over the last four years.

Successful ongoing programs also require an incentive system that favors risk taking. Employees must feel that the benefits of experimentation exceed the costs; otherwise, they will not participate. This creates a difficult challenge for managers, who are trapped between two perilous extremes.

They must maintain accountability and control over experiments without stifling creativity by unduly penalizing employees for failures. Allegheny Ludlum has perfectedthis juggling act: it keeps expensive, high-impact experiments off the scorecard used to evaluate managers but requiresprior approvals from four senior vice presidents. The result has been a history of productivity improvements annually averaging 7% to 8%.

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Finally, ongoing programs need managers and employees who are trained in the skills required to perform and evaluate experiments. These skills are seldom intuitive and must usually be learned. They cover a broad sweep: statistical methods, like design of experiments, that efficiently compare a large number of alternatives; graphical techniques, like process analysis, that are essential for redesigning work flows; and creativity techniques, like storyboarding and role playing, that keep novel ideas flowing. The most effective training programs are tightly focused and feature a small set oftechniques tailored to employees' needs. Training in design of experiments, for example, is useful for manufacturing engineers, while creativity techniques are well suited to development groups.

Demonstration projects are usually larger and more complex than ongoing experiments. They involve holistic, systemwide changes, introduced at a single site, and are often undertaken with the goal of developing new organizational capabilities. Because these projects represent a sharp break from the past, they are usually designed from scratch, using a "clean slate" approach. General Foods's Topeka plant, one of the first high-commitment work systems inthis country, was a pioneering demonstration project initiated to introduce the idea of self-managing teams and high levels of worker autonomy; a more recent example, designed to rethink small-car development, manufacturing, and sales, is GM's Saturn Division.

Demonstration projects share a number of distinctive characteristics:

- They are usually the first projects to embody principles and approaches that the organization hopes to adopt later on alarger scale. For this reason, they are more transitional efforts than endpoints and involve considerable "learning by doing." Mid-course corrections are common.
- They implicitly establish policy guidelines and decision rules for later projects. Managers must therefore be sensitiveto the precedents they are setting and must send strong signals if they expect to establish new norms.
- They often encounter severe tests of commitment from employees who wish to see whether the rules have, in fact,changed.
- They are normally developed by strong multi-functional teams reporting directly to senior management. (For projectstargeting employee involvement or quality of work life, teams should be multilevel as well.)
- They tend to have only limited impact on the rest of the organization if they are not accompanied by explicitstrategies for transferring learning.

All of these characteristics appeared in a demonstration project launched by Copeland Corporation, a highly successfulcompressor manufacturer, in the mid-1970s. Matt Diggs, then the new CEO, wanted to transform the company's approach to manufacturing. Previously, Copeland had machined and assembled all products in a single facility. Costs were high, and quality was marginal. The problem, Diggs felt, was too much complexity.

At the outset, Diggs assigned a small, multifunctional team the task of designing a "focused factory" dedicated to anarrow, newly developed product line. The team reported directly to Diggs and took three years to complete its work.Initially, the project budget was $10 million to $12 million; that figure was repeatedly revised as the team found, through experience and with Diggs's prodding, that it could achieve dramatic improvements. The final investment, a total of $30 million, yielded unanticipated breakthroughs in reliability testing, automatic tool adjustment, and programmable control. All were achieved through learning by doing.

The team set additional precedents during the plant's start-up and early operations. To dramatize the importance of quality, for example, the quality manager was appointed second-in-command, a significant move upward. The same reporting relationship was used at all subsequent plants. In addition, Diggs urged the plant manager to ramp up slowly to full production and resist all efforts to proliferate products. These instructions were unusual at Copeland, where the marketing department normally ruled. Both directives were quickly tested; management held firm, and the implications were felt throughout the organization. Manufacturing's stature improved, and the company as a whole recognized its competitive contribution. One observer commented, "Marketing had always run the company, so they couldn't believe it. The change was visible at the highest levels, and it went down hard."

Once the first focused factory was running smoothly—it seized 25% of the market in two years and held its edge in reliability for over a decade—Copeland built four more factories in quick succession. Diggs assigned members of the initial project to each factory's design team to ensure that early learnings were not lost; these people later rotated intooperating assignments. Today focused factories remain the cornerstone of Copeland's manufacturing strategy and a continuing source of its cost and quality advantages.

Whether they are demonstration projects like Copeland's or ongoing programs like Allegheny Ludlum's, all forms of experimentation seek the same end: moving from superficial knowledge to deep understanding. At its simplest, the distinction is between knowing how things are done and knowing why they occur. Knowing how is partial knowledge; itis rooted in norms of behavior, standards of practice, and settings of equipment. Knowing why is more fundamental: it captures underlying cause-and-effect relationships and accommodates exceptions, adaptations, and unforeseen events.The ability to control temperatures and pressures to align grains of silicon and form silicon steel is an example of knowing how; understanding the chemical and physical process that produces the alignment is knowing why.

Further distinctions are possible, as the insert "Stages of Knowledge" suggests. Operating knowledge can be arrayed in ahierarchy, moving from limited understanding and the ability to make few distinctions to more complete understandingin which all contingencies are anticipated and controlled. In this context, experimentation and problem solving foster learning by pushing organizations up the hierarchy, from lower to higher stages of knowledge.

3. Learning from past experience

Companies must review their successes and failures, assessthem systematically, and record the lessons in a form thatemployees find open and accessible. One expert has called this process the "Santayana Review," citing the famous philosopher George Santayana, who coined the phrase "Those who cannot remember the past are condemned to repeat it." Unfortunately, too many managers today are indifferent, even hostile, to the past, and by failing to reflecton it, they let valuable knowledge escape.

A study of more than 150 new products concluded that "theknowledge gained from failures [is] often instrumental in achieving subsequent successes… In the simplest terms, failure is the ultimate teacher."[4] IBM's 360 computer series, for example, one of the most popular and profitable ever built, was based on the technology of the failed Stretch computer that preceded it. In this case, as in many others, learning occurred by chance rather than by careful planning. A few companies, however, have established processes that require their managers to periodically think about the past and learn from their mistakes.

Boeing did so immediately after its difficulties with the 737and 747 plane programs. Both planes were introduced with much fanfare and also with serious problems. To ensure that the problems were not repeated, senior managers commissioned a high-level employee group, called Project Homework, to compare the development processes of the 737 and 747 with those of the 707 and 727, two of the company's most profitable planes. The group was asked to develop a set of "lessons learned" that could be used on future projects. After working for three years, they produced hundreds of recommendations and an inch-thick booklet. Several members of the team were then transferredto the 757 and 767 start-ups, and guided by experience, they produced the most successful, error-free launches in Boeing's history.

Boeing used lessons from earlier model development tohelp produce the 757 and 767—the most successful, error-free launches in its history.

Other companies have used a similar retrospective approach. Like Boeing, Xerox studied its product development process, examining three troubled products in an effort to understand why the company's new business initiatives failedso often. Arthur D. Little, the consulting company, focused on its past successes. Senior management invited ADL consultants from around the world to a two-day "jamboree," featuring booths and presentations documenting a wide range of the company's most successful practices, publications, and techniques. British Petroleum went even further and established the post-project appraisal unit to review major investment projects, write up case studies, and derive lessons for planners that were then incorporated into revisions of the company's planning guidelines. A five-person unit reported to the board of directors and reviewed six projects annually. The bulk of the time was spent in the field interviewing managers. This type of review is now conducted regularly at the project level.

At the heart of this approach, one expert has observed, "is a mind-set that enables companies to recognize the value of productive failure as contrasted with unproductive success. A productive failure is one that leads to insight, understanding, and thus an addition to the commonly held wisdom of the organization. An unproductive success occurswhen something goes well, but nobody knows how or why." IBM's legendary founder, Thomas Watson, Sr., apparently understood the distinction well. Company lore has it that a young manager, after losing $10 million in a risky venture,was called into Watson's office. The young man, thoroughly intimidated, began by saying, "I guess you want my resignation." Watson replied, "You can't be serious. We just spent $10 million educating you."

Fortunately, the learning process need not be so expensive. Case studies and post-project reviews like those of Xerox and British Petroleum can be performed with little cost other than managers' time. Companies can also enlist the help offaculty and students at local colleges or universities; they bring fresh perspectives and view internships and case studiesas opportunities to gain experience and increase their own learning. A few companies have established computerized data banks to speed up the learning process. At Paul Revere Life Insurance, management requires all problem-solving teams to complete short registration forms describing their proposed projects if they hope to qualify for the company's award program. The company then enters the forms into its computer system and can immediately retrieve a listing of other groups of people who have worked or are working on the topic, along with a contact person. Relevant experience is then just a telephone call away.