

WE DO; COGNITIVE SCIENCE EXPLAINS HOW WE LEARN IN THE THEREFORE, WORKPLACE. ECONOMIC REALITIES DEMAND THAT WE DO SO. WE LEARN



BY ERICA GORDON SOROHAN

Open head; insert knowledge. You'd think it's that easy, given the ways in which most education is delivered, from the kindergarten

classroom all the way up to the executive suite.

Human resource developers long have known, intuitively, that that's not how it works, and a growing body of cognitive research tells us why.

"At the heart of cognitive research," sum up researchers Sue Berryman and Thomas Bailey in *The Double Helix of Education and the Economy*,



"is the observation that intelligence and expertise are built out of interaction with the environment, not in isolation from it. This research...shows that ef-

fective learning engages both head and hand and requires both knowing and doing."

From this common starting point, both academic and applied researchers are exploring the intricacies of learning in the workplace and the complex interplay among individual, group, and organizational learning. Current research on learning indicates that

- ▶ We embed learning in our individual experiences, so we learn best when we direct our own learning.
- ▶ We learn most effectively in context, so learning should be linked directly to work.
- ▶ We learn from each other, so workplaces should enable us to communicate and collaborate freely.
- ▶ We continuously create knowledge, so we need to learn how to capture what we know and share it with others.
- ▶ We learn unconsciously, so we need to learn how to recognize and question our tacit assumptions.

The right stuff

For many years, "the framework for a lot of learning was stimulus-response, or 'learn this information; do this exercise. If you pass the test, you've memorized the right stuff,'" explains Larry Mikulecky, a professor of education at Indiana University, in Bloomington.

"It turns out most heads don't work that way—we don't remember information totally; we reconstruct the way information connects to [other] information," he says. "That means learners have to reconstruct the interconnectors or forget what they've learned in a short time. The stuff you remember is what you use to make the interconnections."

Unfortunately, few businesses or schools are designed in a way that fosters the right "stuff." Most schools continue to stress teacher-delivered instruction, rote memorization of facts, and rewards for the "right" answers. Similarly, most corporate training programs stress short-term activities, trainer-led instruction, and skills transfer. Under these conditions, people do not learn much that they can apply to their "real" work.

During the Industrial Age, this learning gap did not matter much financially to businesses, which tended to be driven by top-down management, fine divisions of labor, and assembly-line production.

Now, the learning gap matters a lot. More and more corporate leaders grasp that success in the Information Age turns on the ability of workers to generate and use knowledge to foster continual improvements.

Changing competitive demands

and technological developments mean that businesses can't teach workers clear-cut rules for every task, Mikulecky says. Rather than memorize "a handful of principles," workers need to "internalize patterns, get feedback, and develop judgment."

Businesses "find fewer opportunities for routinization," agree Berryman and Bailey. Competitive challenges "fundamentally alter what workers at all skill levels need to know, how they need to use what they know, and when they need to learn it," they write.

For instance, studies by the Institute on Education and the Economy at Columbia University in New York City show that

- ▶ Machinists use knowledge of part geometry, metallurgy, output requirements, and tool functioning.

- ▶ Textile workers have to fix

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ISN'T SOMETHING WE
POUR FROM ONE
VESSEL (A TEACHER)
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(A STUDENT)

machines equipped with micro-processors and other electronic components, which means they have to think symbolically and understand complicated manuals and diagrams.

- ▶ Many lesser-educated workers (those without postsecondary schooling) in the banking industry are losing their jobs as computers increasingly handle routine paper processing; the workload is shifting to midlevel employees who use automated systems and handle a broader array of functions.

Implications for managers

As businesses diffuse problem solving and decision making among highly skilled frontline workers, organizations' hierarchical and functional distinctions blur. These changes have important implications for the training and education of managerial

and professional workers.

Berryman and Bailey cite as one indicator of this a spreading dissatisfaction with the postgraduate education provided by business schools, which traditionally have stressed specialized technical skills. "Critics of this approach now argue that the overspecialization of the typical MBA program is not appropriate for the current business environment," they write. "Much greater emphasis must be placed on broader knowledge and interdisciplinary training."

For just those reasons, many corporations are ditching prestigious but cookie-cutter-style executive-education programs in favor of programs specifically tailored to their employees' needs. And "action learning," which gives teams of learners real business problems to solve, probably is the favored strategy for executive education these days, *Fortune* magazine reports.

General Electric, for example, sends different teams of top executives jetting around the world each month to research different global issues facing the company. Before the executives leave, professors from the University of Michigan prep them on organizing, researching, and decision-making skills. When the execs return, they brief CEO Jack Welch and other senior managers on their findings.

Action learning is representative of emerging models for workplace learning, which recognize that knowledge isn't something we pour from one vessel (a teacher) into another (a student). Instead, scholars tell us that our natural drive to learn thrives when we can direct our own learning, share knowledge, and emulate experts—and make mistakes.

Gray-green classrooms

That being the case, "taking the worker out of the context of actual work practice and into a white laboratory or a gray-green training classroom is most likely not the optimal way to ensure that learning takes place," note researchers at the Institute for Research on Learning in Palo Alto, California.

A study by researchers at the Laboratory for Cognitive Studies of Work at City University of New York supports that contention.

Sylvia Scribner (who died in 1991) and Patricia Sachs spent five years exploring how learning at work actually takes place and in what ways learning on the job differs from classroom learning.

They studied two manufacturing companies that had implemented manufacturing resource production, a data-base computer system. To use MRP expertly requires "functional knowledge," which they defined as an integrated understanding of MRP theory (abstract knowledge) and practical production knowledge (embodied knowledge).

In a study released in 1991, Scribner and Sachs reported the following findings:

- ▶ Everyday work activities are settings for learning. How we interact with people, objects, and concepts shapes what we learn and understand about them.
- ▶ People can achieve conceptual understanding on the job. They can do this even if they don't receive extensive academic, professional, or

even on-the-job training.

▶ How the workplace is set up—not the presence of technology—is what enhances or inhibits learning. A setup that encourages self-direction and collaboration helps people develop conceptual understanding; one that aims for higher-level control promotes routinized, inflexible responses.

"If people can develop conceptual understanding on the job without school-based training, the workplace is clearly a potential learning environment," Scribner and Sachs wrote. "What educators, employers, and policymakers need to understand is how to tap into that potential."

Therein lies the tricky part for trainers. Once liberated from your "gray-green" classrooms, where do you go with workplace learning?

Back to work.

On-the-job learning

Specifics vary, but new models for on-the-job learning all build on the fundamental principle that we learn by doing. Mikulecky, an expert in

job-related literacy, illustrates the point by contrasting two approaches to upgrading workers' basic skills.

Often, companies will send their workers off site for remedial literacy classes, hoping that they improve their basic skills and transfer those skills to the workplace, Mikulecky says.

Companies might realize better results if they would define clearly what they want to accomplish, weave learning into the work, and tailor instruction specifically to learners' needs. For instance, a literacy program for automobile assemblers would integrate reading and writing instruction with the manuals and equipment used on the job. The instruction would address workers' various levels of proficiency in literacy. Mikulecky calls this model "functional context training."

The link between work and learning also has cast an old model for workplace learning—the apprenticeship model—in a new light.

Traditional apprenticeship exemplifies on-the-job learning because it

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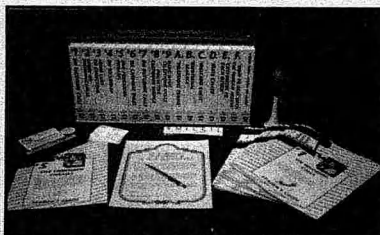
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draws no demarcation between work and learning. Many on-the-job learning activities resemble apprenticeships. A 1990 study by Scribner and Sachs makes the point.

The researchers looked at how "unskilled" stockroom workers learned to use manufacturing resource production. Managers gave no guidance other than a general directive that experienced workers should train new co-workers.

Left to their own devices, veterans folded the training into the work. They reorganized their work to bring newcomers into the process; they talked to new workers about the work; new workers observed how veteran employees handled unexpected problems. When the experience gap was slight, "trainer" and "trainee" taught each other.

The researchers concluded that ways of transferring knowledge and work practices from employee to employee arise naturally in the course of doing work. "Clearly, the social relations of work are not reorganized to accommodate training," the researchers note. "Instead, training is embedded in the preexisting system."

Scribner and Sachs also made this observation: "When workers participate in the performance of work tasks along with [co-workers], knowledge acquisition is an institutional by-product."

In other words, we learn from each other, and we learn by doing. Conversely, we do something, we learn. Moreover, different types of learning produce different types of knowledge.

Learning on the run

Drawing on a broad theoretical research base, Victoria Marsick of Columbia University and Karen Watkins of the University of Texas, Austin, distinguish among three types of workplace learning: formal, informal, and incidental.

HRD specialists focus largely on formal training, which is usually classroom based and highly structured. But according to Watkins, "90 percent of workplace learning is informal or incidental." Informal and incidental learning both take place on an individual level, a group level,

and an organizational level.

Informal learning occurs when a person decides he or she needs to know something to do his or her work and takes steps to learn it. Informal learning is self-motivated, self-directed, and purposeful. It might involve a learning guide, such as a mentor; it produces explicit knowledge. According to Watkins, capturing the benefits of employees' informal knowledge "is a critical issue facing organizations."

Incidental learning refers to learning that takes place in the course of doing work. For instance, we form impressions of our co-workers, make assumptions about how the organization operates, and gather a sense of corporate priorities. Incidental learning "is not a conscious process," notes Watkins, and in the course of incidental learning, we "can embed wrongful ideas about the organization" that can block learning.

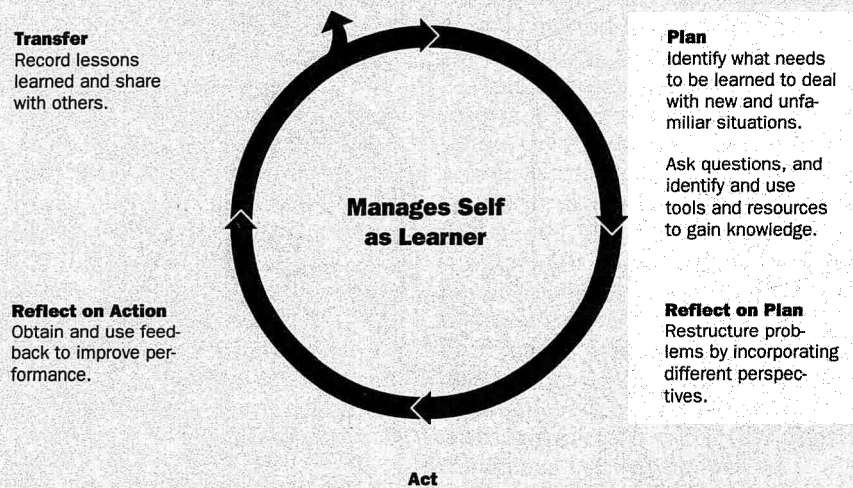
"It's difficult for trainers to structure or predesign informal and incidental learning, but it can be enhanced," Marsick and Watkins write. The key, they say, is for organizations to enable three characteristics:

- ▶ "proactivity," or self-direction, which is associated with employee empowerment
- ▶ "critical reflection," which means

FIGURE 1

Workplace-Learning Process for Employees

Use assignments, business problems, and experiences as learning opportunities.



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learning to "surface" and question tacit assumptions

▶ "creativity," which means learning to reframe problems and look at them from many different points of view.

The terms sound cut-and-dried, but to learn and use these "metacognitive" skills (learning how to learn), people often must engage in painful tasks: unlearning longtime practices, acknowledging their tacit assumptions, and altering or even forsaking deeply held beliefs. This kind of transformational learning holds the greatest potential for growth but also requires that individuals take some significant emotional risks.

Emotionally charged

Marsick and Watkins contend that this juncture between the emotional and the cognitive aspects of learning poses the biggest challenge to human resource developers who seek to enable effective, continuous learning in the workplace.

"We would be insensitive if we did not think that adults sent to retraining because their jobs were being phased out have strong feelings. Or that managers sent to mandatory interpersonal skills training...will not have feelings that affect the learning process. Or that individ-

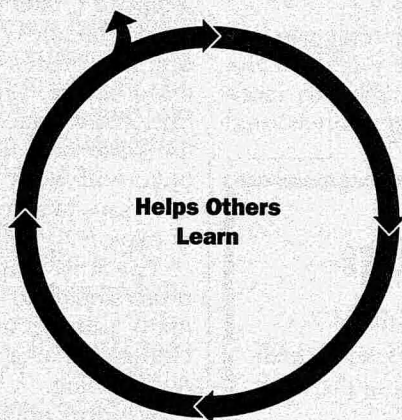
FIGURE 2
Workplace-Learning Process for Managers

Use assignments, business problems, and experiences as learning opportunities.

Transfer
 Record lessons learned and share with others.

Plan
 Establish an environment conducive to workplace learning.

Assist others in setting and meeting goals.



Reflect
 Encourage reflection.

Provide feedback to others on learning accomplishments.

Review Plan
 Help others identify tools and resources.

Act

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uals entering a team-building session, who are asked to share their criticism of one another when this has hitherto been undiscussible, will be able to pick up on Monday as though nothing had happened," they write in *Informal and Incidental Learning in the Workplace* (Routledge, 1990). "Trainers need skills for dealing effectively with these situations."

Researchers point out that these emotionally charged tasks often are hardest for those who must lead the way.

Although many highly educated professionals tout continuous learning, they often are the least able to engage in the critical and reflective thinking that transformational learning requires, observes Chris Argyris of Harvard's graduate schools of business and education.

His long-term studies of management consultants showed that when continuous-improvement projects addressed professionals' own performance, they "began to feel embarrassed," Argyris writes in the May/June 1991 issue of *Harvard Business Review*. "Far from being a catalyst for real change, such feelings caused most to react defensively."

He describes the phenomenon as the difference between people's espoused "theories-of-action" (how

they think they behave) and people's "theories-in-use" (how they really behave).

Theories-in-use and other forms of tacit, or unconscious, knowledge also block learning at the organizational level; for example, through unspoken and unexamined policies and values, or what Argyris terms "organizational defensive routines."

But he contends in his writings that companies "can break out of this vicious circle [by] teaching people how to reason in a new way."

He employs a case-study approach that teaches employees—starting with top-level managers—to examine their own theories-in-use in conjunction with addressing real business issues. This approach, he writes, "legitimizes talking about issues that people have never been able to discuss before."

The discussions can be painful, Argyris acknowledges, but by tackling such issues, organizations learn to work more openly and more flexibly. "They are laying the groundwork for continuous improvement," he writes. "They are learning how to learn."

From theory to practice

One professional firm that's aiming to become a continuous learning organization is dealing firsthand with

the challenge of persuading highly educated employees to embrace continuous learning.

In 1991, an Ernst & Young task force studied the firm's formal professional-development programs and confirmed a compelling statistic: Partners reported that 90 percent of their learning takes place on the job—rather than in formal training programs—through such means as self-study, computer-based education programs, professional coaching, and project teams.

"I said, if that's the case, we have to help people do this better and faster," recalls Katie Weldon, the firm's co-director of education methods. "To meet the challenges of a constantly changing business environment, the firm's professionals must be able to continually add to the firm's collective knowledge."

A literature search led Weldon and her colleague Mindy Denny to Marsick and Watkins. "What was driving us was the need for a practical, not theoretical, process to improve people's ability to capture [on-the-job] learning," says Weldon. Using Marsick and Watkins' theories as a framework, Weldon and Denny devised a model for continuous workplace learning.

The model explains how to use business experiences as learning opportunities and emphasizes the use of "reframing" to generate new solutions for even familiar problems. It addresses employees as learners, and managers as coaches, and incorporates eight skills employees need in order to learn from experience. (See figures 1 and 2.)

According to the Ernst & Young model, self-learners

- ▶ use business experiences and problems as triggers for learning
- ▶ figure out what they need to know to deal with new situations
- ▶ identify resources from which they can gain knowledge
- ▶ restructure problems by incorporating different perspectives
- ▶ obtain and use feedback as they execute tasks to improve their performance and extract the lessons learned from the experience
- ▶ record the "learnings" and share them with others through such means as electronic files, computer

data bases, or diaries.

The model calls for Ernst & Young managers to help others learn by

- ▶ establishing an environment conducive to workplace learning
- ▶ helping other set and meet learning goals
- ▶ helping others identify tools and resources for gaining knowledge
- ▶ providing feedback to others on

their learning accomplishments so they can improve their performance and capitalize on successes

- ▶ encouraging reflection by asking employees questions to prompt thinking about actions
- ▶ recording and transferring learning.

Weldon and Denny crafted the model to suit the firm's highly motivated, well-educated professional

staff. "We're not teaching them how to learn; we're giving them a process to use," Weldon explains.

A new lens for learning

Suppose a client presents a partner with a business problem similar to one the professional has encountered before. Chances are, the professional will tackle the new problem the same way, figuring what worked once will work again. The inclination, says Weldon, is "to act instead of explore."

The new approach encourages professionals to view problems from many perspectives, which experts emphasize as a core skill for effective learning.

Weldon and Denny liken their model for learning to a kaleidoscope. "Through planning, reflection, and feedback, we can develop a series of 'pictures' of how to deal with new, unexpected, and complex challenges facing us," they write.

"Now we have a process for taking job assignments and business problems and turning them into learning opportunities," Weldon says. "You have an experience, reflect on it, pull abstract knowledge from it, record it, and share it with others."

To record knowledge gleaned from experience, the Ernst & Young professional-development staff has designed a continuous-learning data base.

According to Weldon, employees would enter descriptions of how they tackled various business problems, according to a predetermined data-base architecture. Users faced with a problem could obtain insights by searching the data base for similar business experiences.

"We're just beginning to build the prototype," says Weldon. Eventually, she envisions one companywide data base that anyone could tap into and browse.

Denny and Weldon have produced a video to introduce the "learning to learn" model to all Ernst & Young professionals. The video introduces the concept of continuous workplace learning, explains why it is important to the firm's success, and depicts a scenario of workplace learning in action.

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staff will incorporate the model into formal classes as well. "We can't do it all on the job," says Weldon. "We want to give people a chance to practice restructuring problems; we think this is where we're the weakest. If we can teach them this mental process, the chances of their using it on the job will be greater." The whole process could be worked into an interactive desktop learning experience as well, Weldon notes.

A climate for change

Meanwhile, the professional-development staff have incorporated the continuous workplace learning model into their own office and soon will launch a pilot in an Ernst & Young professional practice office.

Persuading Ernst & Young's high-achieving, busy, action-oriented professional staff to embrace the model poses the biggest challenge, Weldon says.

"There will be skepticism—'Is this time well spent?'" she says. "I think it will enable employees to get their

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work done faster, with less rework and more creativity—but I have no proof."

One strategy to encourage buy-in might be to incorporate continuous learning into employees' performance appraisals. "Make it something that's expected and rewarded," Weldon suggests.

Ultimately, for continuous learning to permeate the firm fully will require a significant shift in a corporate culture.

"We're a world of experts," notes Weldon. Ernst & Young professionals

prepare rigorously to serve their clients; they must acquire expertise in a particular industry and technical discipline, and develop interpersonal and leadership skills. They prize knowing and doing.

But, given today's competitive realities, even fast-track professionals must slow down enough to embrace the values of learning and reflecting. For human resource developers, "part of the challenge of creating a continuous learning organization is creating a climate where it is OK not to know," Weldon says. "It's OK not to be an expert on everything. We need to be a world of learners as well." □

Erica Gordon Soroan is an associate editor of *Training & Development*.

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