

Learning on the Job: Myth vs Science

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I am delighted to introduce Annie Murphy Paul, who today makes her debut appearance as a guest writer for the “We’re Only Human” blog. Annie Murphy Paul is one of the most highly regarded science writers working today, and one of our keenest interpreters of psychological science. Many of you already know her as a contributing writer at *Time* magazine, a weekly columnist at Time.com and MindShift, and as the author of two popular and well-received books: *Origins*, an exploration of the crucial nine months before birth, and *The Cult of Personality*, a cultural history and scientific critique of personality testing.

Her latest book, in the works, is on the science of learning. Her wide-ranging research for this book, called *Brilliant: The New Science of Smart*, positions her well to summarize and explain a new report on the science of training, in the most recent issue of *Psychological Science in the Public Interest*. Businesses and organizations invest millions of hours and dollars every year on efforts to make their workers better workers, but a surprisingly small portion of this investment is based on rigorous science. Yet the science is there for the taking, as she describes here:

There’s a lot of important information packed into [“The Science of Training and Development in Organizations: What Matters in Practice,”](#) a new report published in the journal *Psychological Science in the Public Interest*. But its most significant insight is delivered right up front: “Training is not as intuitive as it may seem,” Eduardo Salas, a psychological scientist at the University of Central Florida, and his coauthors declare. “There is a science of training that shows that there is a right way and a wrong way to design, deliver, and implement a training program.”

The exhaustive literature review that follows makes clear that there is, indeed, a science of training—one that has developed and matured over the past 30 years. But this science is too often ignored by vendors selling their own decidedly unscientific approaches to training, and by well-meaning employers and managers who assume that their intuition is a reliable guide in putting together a worker training program. Salas's report is full of compelling examples of how intuitive assumptions can lead trainers astray—and how science can ensure that training is truly effective. Here, an assemblage of common misconceptions, corrected by the science of training:

It's what happens during training that matters. Actually, what happens before and after training can be just as important. Beforehand, employers should take care to communicate clearly what the training is about and how it relates to workers' jobs; afterward, they should seek employee feedback and offer support for newly-acquired skills.

Training should be focused on getting workers to remember everything they need to know to do their jobs. There's so much information available today that trainers need to distinguish between content that is "need-to-know," and that is "need-to-access." For the latter category, Salas writes, "training should teach people where and how to find that information rather than seeking to have them retain that information in memory."

As part of training, employees should be tested on their abilities and asked to focus on the areas that need improvement. Research shows that training is more effective when it's presented as an opportunity, rather than as a test, and when it emphasizes its benefits to participants, rather than participants' existing deficits.

Once employees have been trained, those skills are in place and subsequent training can move on to teaching new skills. In fact, "skill decay is a major problem in training," writes Salas. He cites a meta-analysis finding that a year after training, trainees have lost over 90 percent of what they learned. Skill decay can be prevented by giving workers frequent opportunities to practice their new skills, and by scheduling "refresher" training.

The motivation to learn has to come from within the individual employee—there's not much employers can do about it. Actually, Salas reports, employers can act to increase workers' motivation: by being clear about the link between what's being taught and how it will be used on the job, and by making sure employees feel supported in their efforts to learn by their supervisors and by the organization as a whole.

Workbooks, lectures, and videos are the best way to deliver training information. These media, which emphasize information and demonstration, "remain the strategies of choice in industry. And this is a problem," Salas writes. "We know from the body of research that learning occurs through the practice and feedback components." Employers can increase the effectiveness of training by making the process more active and engaging for participants.

The best way to arrange training is to show workers what to do, then let them jump in and try it for themselves. "Not all practice is created equal," Salas notes. "Unstructured practice without objectives, appropriate stimulation, and useful feedback can teach wrong lessons." Workers will get the most out of practice when they are provided with constructive and timely feedback that identifies what

they may be doing wrong and how to fix it.

The better workers perform during training, the better they'll perform on the job. Not necessarily. Research shows that conditions that maximize performance during training are often different from those that maximize the transfer and retention of those skills. “Drilling” information leads to rapid learning during training, for example, but it leads to poorer retention and transfer than other methods that promote “deep learning.”

Making errors during training should be avoided. “Because errors often occur on the job, there is value in training people to cope with errors both strategically and on an emotional level,” Salas notes. Guiding workers to make errors, and then providing them with strategies to correct their mistakes, will lead them to understand the task in greater depth and will help them deal with errors on the job.

Adding technology is a surefire way to improve training. “Both traditional forms of training and technology-based training can work, but both can fail as well,” Salas observes. Technology must be implemented in a thoughtful way, in accordance with scientific findings, in order to add to the effectiveness of training.

Workers should always be allowed to make their own choices about what they need to learn. Research shows that “learner control,” although it sounds appealing, doesn’t lead to greater learning. Left to their own devices, workers may not be knowledgeable or motivated enough to make wise decisions about how and what to learn.

In training using simulations, it’s important for the virtual setting to be precisely the same as the one the worker will encounter on the job. Actually, Salas writes, what matters is not the “physical fidelity” of the simulation, but its psychological fidelity—how accurately it evokes the feelings and the responses the worker will have on the job.

“The Science of Training and Development in Organizations” is full of surprising conclusions drawn from research. With the rich body of evidence now available, we no longer need to rely on intuition—or the claims of hucksters—to design workplace training. That’s what science is for.

You can read more of Annie Murphy Paul’s writing about the science of learning at her website, www.anniemurphypaul.com. She also invites scientists to contact her directly at annie@anniemurphypaul.com.