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What Research Says Matters *Most* Before, During, and After Training

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The Science of Training and Development in Organizations: What Matters in Practice

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aps PSYCHOLOGICAL SCIENCE

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Summary

Organizations in the United States alone spend billions on training each year. These training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. Training has successfully been used to reduce errors in such high-risk settings as emergency rooms, aviation, and the military. However, training is also important in more conventional organizations. These organizations understand that training helps them to remain competitive by continually educating their workforce. They understand that investing in their employees yields greater results. However, training is not as intuitive as it may seem. 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 research on training clearly shows two things: (a) training works, and (b) the way training is designed, delivered, and implemented matters. This article aims to explain what ...

Introduction

We start this article with two assertions: (a) properly designed training works, and (b) the way training is designed, delivered, and implemented can greatly influence its effectiveness. That well-designed training is impactful is important as continuous learning and skill development are now a way of life in modern organizations. To remain competitive, organizations and countries must ensure that their workforce continually learns and develops. Training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. In the United States alone, organizations spend about $135 billion in training individuals per year (Patel, 2010). Organizations invest in training because they believe a skilled workforce represents a competitive advantage.

Therefore, decisions about what to train, how to train, and how to implement and evaluate training should be informed by the best information science has to offer. ... assertion, that ... presents results from ... meta-analyses that provide ... clear ... summarize what the ... evidence-based ... decades. In the first ... noted that it was "faddish to an extreme," often testing new methods emerging in practice but unrelated to theories of learning. Kraiger, Ford, and Salas (1993) also commented on how training research and theory lagged far behind developments in learning theory in other areas of psychology.

Thirty years later, Salas and Cannon-Bowers (2001) reviewed the training literature and concluded that training theory and research had made great advancements. The

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Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science In The Public Interest*, 13(2), 74-101. http://www.psychologicalscience.org/index.php/publications/journals/pspi/training-and-development.html

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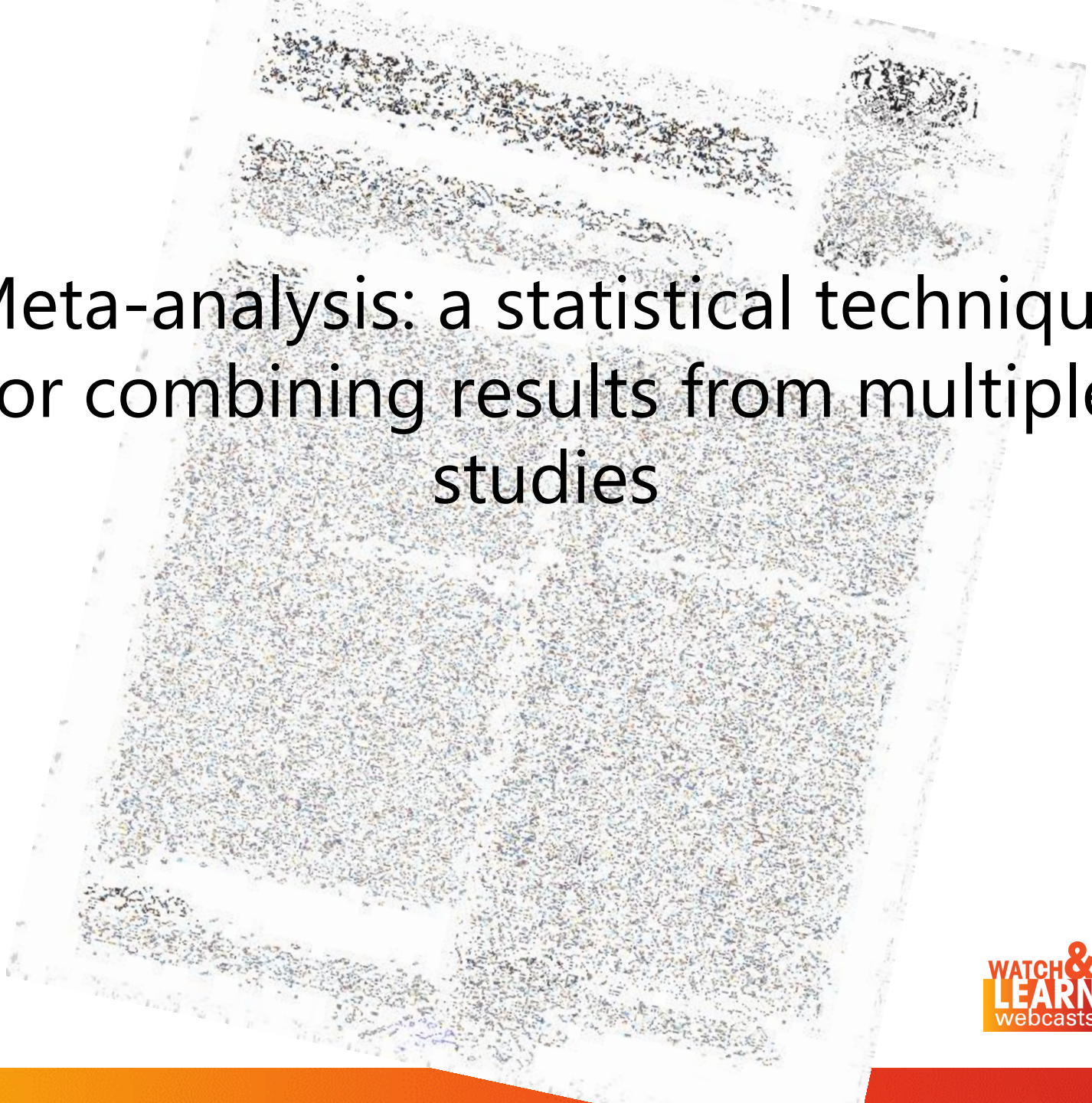

Meta-analysis: a statistical technique for combining results from multiple studies

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Science of Learning
Science of Training

Interactive question format. Type answers into **Chat**.

What can we learn from the study(ies) to improve training outcomes?

...a trained workforce can provide a competitive advantage to companies, (so) it makes sense to implement the best training program possible — especially one guided by sound science.

Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science In The Public Interest*, 13(2), 74-101. http://www.psychologicalscience.org/index.php/publications/journals/pspi/training-and-development.html

Research (shows) …what occurs **during** training is not the only thing that matters; what occurs **before** and **after** training is just as important for …success.

Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science In The Public Interest*, 13(2), 74-101.
http://www.psychologicalscience.org/index.php/publications/journals/pspi/training-and-development.html

Organizations that utilize scientific and known-to-be effective training practices posses higher organizational performance. (Select the best answer)

A. Yes

B. No

Type A or B into CHAT

Organizations that utilize scientific and known-to-be effective training practices posses higher organizational performance. (Select the best answer)

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Organizations that utilize scientific and known-to-be effective training practices posses higher organizational performance. (Select the best answer)

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B. No

Huselid, M. A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal, 38,* 635–672. http://www.markhuselid.com/pdfs/articles/1995_AMJ_HPWS_Paper.pdf

Huselid, M. A., & Becker, B. E. (2011). Bridging micro and macro domains: Workforce differentiation and strategic human resource management. *Journal of Management,* 37, 421–428. http://www.markhuselid.com/pdfs/articles/2011_Huselid_Becker_JOM.pdf

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Learning is (the) process of acquiring new knowledge and behaviors as a result of practice, study, or experience.

Learning transfer is the (degree to which) learning during training is… applied on the job or affects later job performance.

Learning transfer is a critical outcome.

WHAT IS MOST IMPORTANT *BEFORE* TRAINING?

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Which of the following did the meta-analysis say is critical to be completed *before training* for optimal training outcomes? (Select *all* that apply)

A. Make sure that training focuses on what stakeholders ask for
B. Uncover needs of different people/groups
C. Find out what people need to remember *and* what they need to access
D. Schedule training promptly
E. Prepare supervisors to support staff post training

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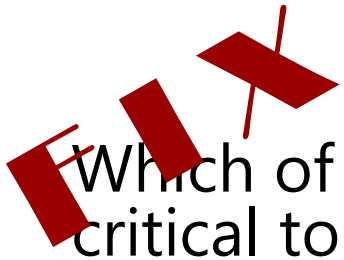

Which of the following did the meta-analysis say is critical to be completed *before training* for optimal training outcomes? (Select *all* that apply)

A. Make sure that training focuses on ~~what stakeholders ask for~~ real job tasks

B. Uncover needs of different people/groups

C. Find out what people need to remember *and* what they need to access

D. Schedule training ~~promptly~~ close to when knowledge is needed

E. Prepare supervisors to support staff post training

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Table 3. Checklist of Steps to Take Before Training

Step	Actions	Outcomes
☐ Conduct training needs analysis	Determine what needs to be trained, who needs to be trained, and what type of organizational system you are dealing with.	Clarifies expected learning outcomes and provides guidance for training design and evaluation. Enhances training effectiveness.
☐ Job–task analysis	Specify work and competency requirements. Examine teamwork demands, if needed. Identify what trainees need to know vs. what trainees need to access. Consider conducting a cognitive task analysis for knowledge-based jobs.	Ensures that the training provided will address real job requirements and demands.
☐ Organizational analysis	Examine strategic priorities and the culture, norms, resources, limitations, and support for training. Determine whether policies and procedures in place support training.	Enables strategic resource-allocation decisions. identifies how the work environment can support or hinder the training objectives.
☐ Person analysis	Uncover who needs training and determine what kind of training they need. Determine whether training must be adapted for some learners.	Clarifies training demand and trainees' needs. Maximizes benefits of the training by ensuring fit with trainees' needs.
☐ Prepare learning climate		
☐ Schedule training	Schedule training close to when trainees will be able to use on the job what they have learned. Plan to offer refresher training when skill decay cannot be avoided.	Reduces skill decay and atrophy.
☐ Notify employees	Communicate clear expectations about the training. Describe training as an "opportunity" without overselling. Inform employees about any posttraining follow-up. Communicate the importance of training.	Encourages the right attendees. Ensures trainees enter with appropriate expectations, which enhances readiness and learning.
☐ Establish attendance policies	Determine whether attendance should be mandatory. Use the mandatory label selectively.	Helps ensure learner motivation and attendance.
☐ Prepare supervisors and leaders	Prepare supervisors to support their employees and send the right signals about training	Enhances employees' motivation to learn.

WHAT IS MOST IMPORTANT *DURING* TRAINING?

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On the basis of a review of the literature, (we) identified (important) characteristics of… training that enhances *learning* and *transfer*…

Noe, R. A., & Colquitt, J. A. (2002). Planning for training impact: Principles of training effectiveness. In K. Kraiger (Ed.), *Creating, implementing, and maintaining effective training and development: State-of-the-art lessons for practice* (pp. 53–79). San Francisco, CA: Jossey-Bass.

Which of the following improves learning and transfer in training? (Select *all* that apply)

A. People are trained in the manner they prefer to be trained
B. Learning content, examples, and practice are relevant to their job
C. Training provides support for recalling critical content for future use
D. Feedback tells them if their answers are correct or incorrect

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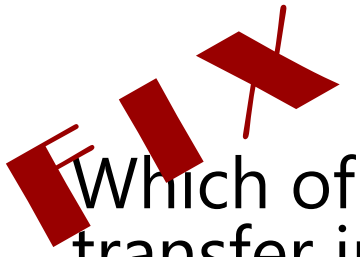

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A. ~~People are trained in the manner they prefer to be trained~~

B. Learning content, examples, and practice are relevant to their job

C. Training provides support for recalling critical content for future use

D. Feedback ~~tells them if their answers are correct or incorrect~~ helps corrects errors in thinking or doing

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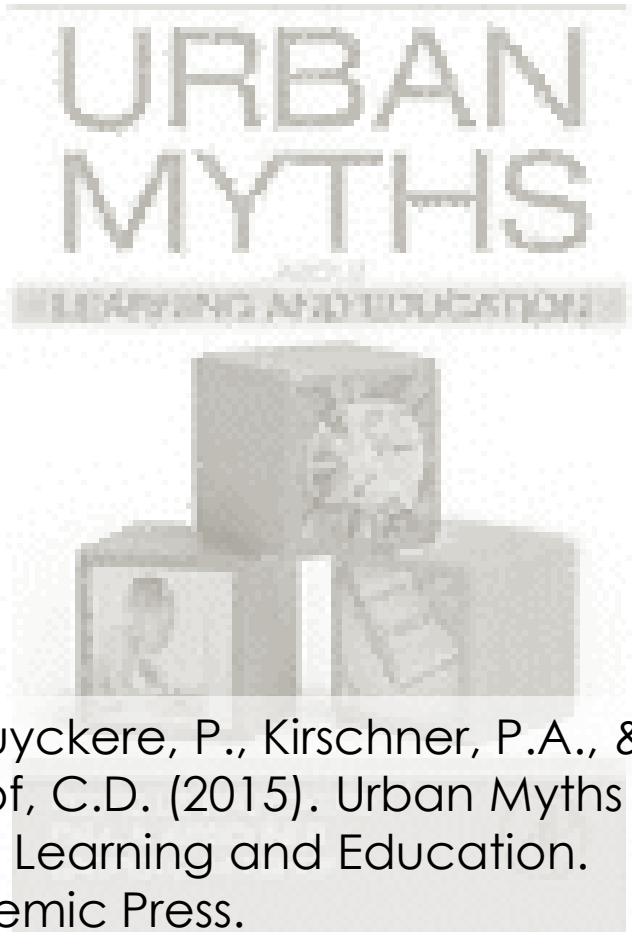
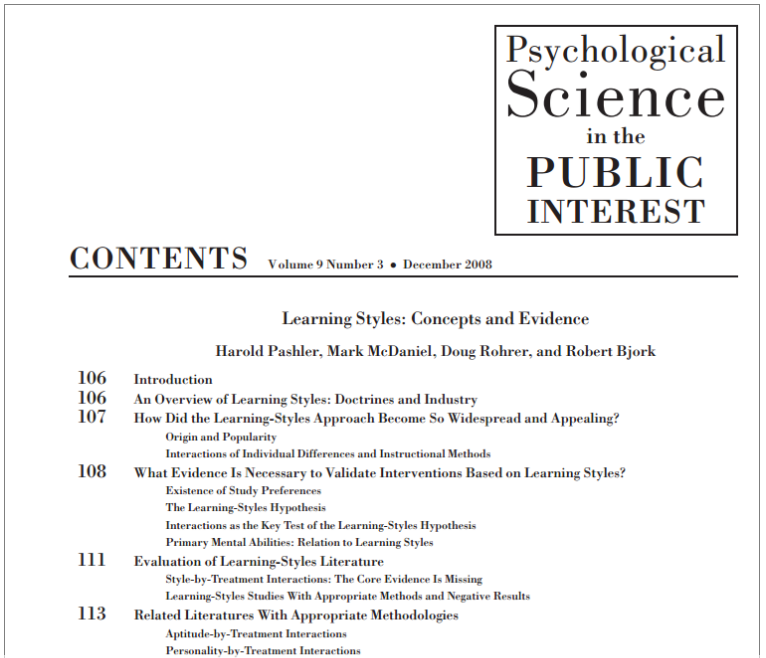
It's *not* important that people be trained in their preferred manner?



De Bruyckere, P., Kirschner, P.A., & Hulshof, C.D. (2015). Urban Myths about Learning and Education. Academic Press.



Pashler, H., McDaniel, M, Rohrer, D, & Bjork, R. (2008). Learning Styles: Concepts and Evidence. *Psychological Science In The Public Interest*, 9(3), 103-119.

Which of the following is/are true about using technology for training? (Select *all* that apply)

A. Entertainment-value should be a major driver when developing technology-based training
B. Technology-based training is usually cheaper than other types of training
C. Technology-based training has better outcomes than other types of training
D. Learners do best with complete control when using technology-based training

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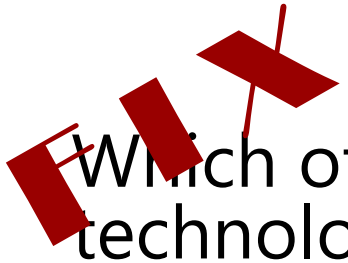

Which of the following is/are true about using technology for training? (Select *all* that apply)

A. Entertainment-value should *not* be a major driver when developing technology-based training

B. Technology-based training is ~~usually~~ often *not* cheaper than other types of training

C. Technology-based training has ~~better~~ similar outcomes ~~than~~ as other types of training

D. Learners do best with guidance and some ~~complete~~ control when using technology-based training

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Ah-ha! Classroom training is better than technology-based training, right?

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Summary

Organizations in the United States alone spend billions on training each year. These training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. Training has successfully been used to reduce errors in such high-risk settings as emergency rooms, aviation, and the military. However, training is also important in more conventional organizations. These organizations understand that training helps them to remain competitive by continually educating their workforce. They understand that investing in their employees yields greater results. However, training is not as intuitive as it may seem. 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. Organizations understand that training helps them to remain competitive by continually educating their workforce. They understand that investing in their employees yields greater results. However, training is not as intuitive as it may seem. 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. Organizations understand that training helps them to remain competitive by continually educating their workforce. They understand that investing in their employees yields greater results. However, training is not as intuitive as it may seem. There is a science of training that shows that there is a right way and a wrong way to design, deliver, and implemented, and implemented matters. This article aims to explain for implementing a training program in an organization. In Steps to take at each of these three time periods are listed and described and are summarized in a checklist for ease of use. may come up when deciding to implement a training program. research has is important in this area, including some of training works, and (b) the way training is designed, delivered,

and implemented can greatly influence its effectiveness. That well-designed training is impactful is important as continuous learning and skill development are now a way of life in modern organizations. To remain competitive, organizations and countries must ensure that their workforce continually learns and develops. Training and development activities allow organizations to adapt, compete, excel, innovate, produce, be safe, improve service, and reach goals. In the United States alone, organizations spend about $135 billion in training individuals per year (Patel, 2010). Organizations invest in training because they believe a skilled workforce represents a competitive advantage.

Therefore, decisions about what to train, how to train, and how to implement and evaluate training should be informed by the best information science has to offer. This article briefly training works. We build on this evidence to review and summ- what the research evidence-based actions to ensure training effectiveness. Train- Annual Review of Psychology, Campbell (1971) characterized methods emerging in practice but unrelated to theories of ments in learning theory in other areas of psychology. Salas and Cannon-Bowers (2001) training and that training

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How can we best assure that training transfers to the job? (Select *all* that apply)

A. Make the visual aspects of the training look as much like the real job as possible
B. Have people practice the types of mistakes and troubleshooting that occur on the job
C. Make training enjoyable
D. Make sure practice embeds the variety and depth of thinking processes that happen on the job

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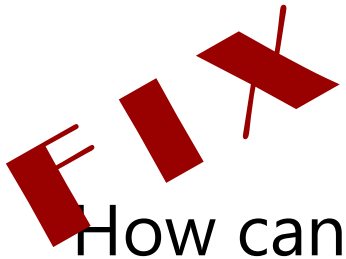

How can we best assure that training transfers to the job? (Select *all* that apply)

Cognitive fidelity is more important than physical fidelity

~~A. Make the visual aspects of the training look as much like the real job as possible~~

B. Have people practice the types of mistakes and troubleshooting that occur on the job

C. Make training ~~enjoyable~~ **valuable**

D. Make sure practice embeds the variety and depth of thinking processes that happen on the job

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Table 4. Checklist of Steps to Take During Training

Step	Actions	Outcome
☐ Enable right trainee mindset		
☐ Build self-efficacy	Deliver training in a way that builds trainees' belief in their ability to learn and perform trained skills. Reinforce performance during training.	Enhances motivation and increases perseverance when on the job.
☐ Promote a learning orientation	Encourage trainees to participate in training to learn rather than to appear capable. If most trainees will not have that orientation, design more structured training experiences.	Leads to greater learning.
☐ Boost motivation to learn	Engage trainees and built their interest. Ensure that training is perceived as relevant and useful. Show why it benefits them.	Leads to learning and positive reactions to learning; may encourage transfer back on the job.
☐ Follow appropriate instructional principles		
☐ Use a valid training strategy and design	Include these elements in training: provide information, give demonstrations of good/bad behaviors, allow trainees to practice, and give meaningful and diagnostic feedback.	Helps trainees understand and practice the knowledge, skills, and abilities that they need to develop; allows for remediation.
☐ Build in opportunities for trainees to engage in transfer-appropriate processing	Incorporate features that require trainees to engage in the same cognitive processes during training that they will have to in the transfer environment (e.g., sufficient variability and difficulty). Recognize that performance during training does not necessarily reflect trainees' ability to apply what they have learned in the transfer environment.	Equips trainees to be better able to apply what they learned when performing their job.
☐ Promote self-regulation	Maintain trainees' attention and keep them on task by encouraging self-monitoring.	Allows trainees to monitor their progress toward goals; enhances learning.
☐ Incorporate errors into the training	Encourage trainees to make errors during training, but be sure to give guidance on managing and correcting the errors.	Improves transfer of training and equips trainees to deal with challenges on the job.
☐ Use technology-based training wisely	Technology can be beneficial in training, but proceed with caution. Recognize that entertaining trainees is insufficient for return on investment.	Optimizes individual learning.
☐ Use computer-based training (CBT) correctly	Ensure that any CBT is based on sound instructional design, for example, providing trainees with guidance and feedback. Recognize that not all training can be delivered via computer.	Allows for self-paced learning.
☐ Allow user control wisely	Provide sufficient structure and guidance to trainees when allowing them to make decisions about their learning experience.	Allows for individualized training experiences while ensuring trainees have appropriate learning experience.
☐ Use simulation appropriately	Best to train complex and dynamic skills, particularly those that may be dangerous. Ensure the simulation is job relevant, even if it is not identical to the job. The priority should be on psychological fidelity rather than physical fidelity. Build in opportunity for performance diagnosis and feedback. Guide the practice.	Enhances learning and performance; allows trainees to practice dangerous tasks safely.

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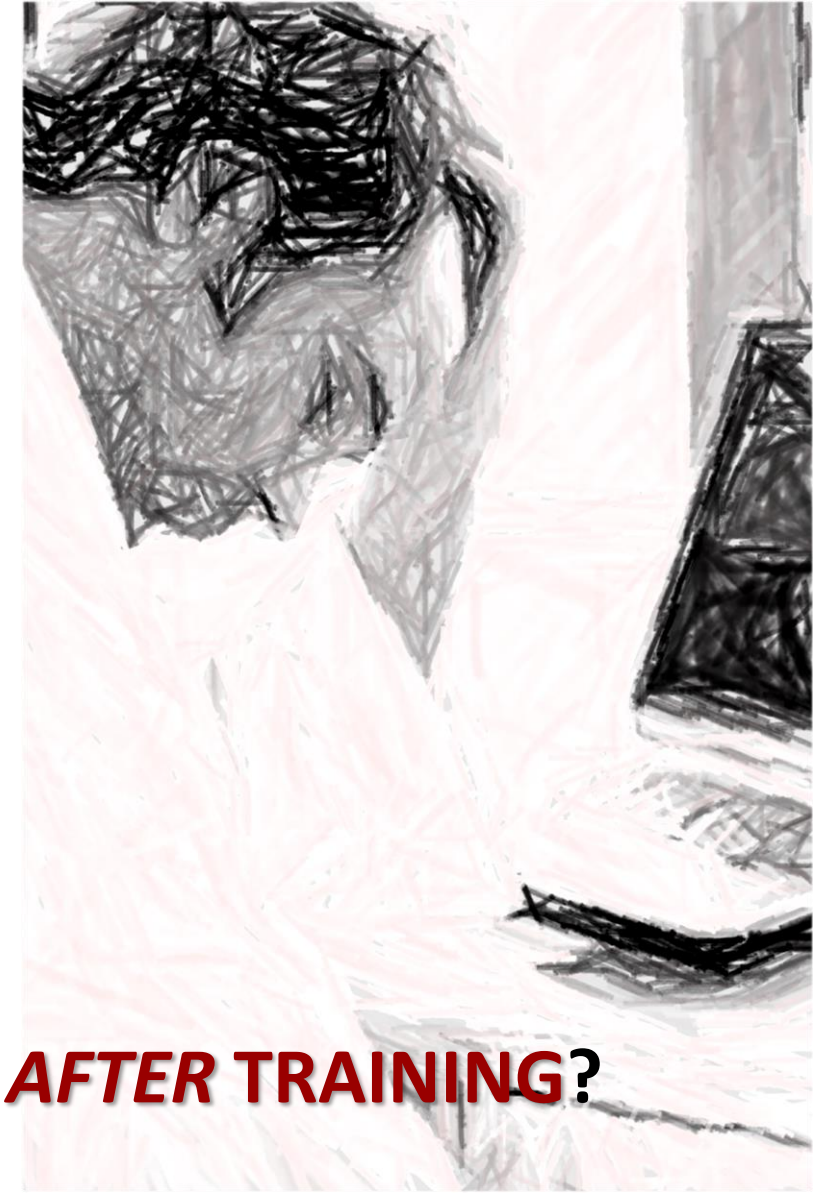

WHAT IS MOST IMPORTANT *AFTER* TRAINING?

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(What happens) after training can have as great an impact on training effectiveness as what happens during training…

Rouiller, J. Z., & Goldstein, I. L. (1993). The relationship between organizational transfer climate and positive transfer of training. *Human Resource Development Quarterly, 4, 377–390.*

Tracey, J. B., Tannenbaum, S. I., & Kavanagh, M. J. (1995). Applying trained skills on the job: The importance of work environment. *Journal of Applied Psychology, 80, 239–252.*

What can supervisors and team leads do after training to make transfer more likely? (Select *all* that apply)

A. Do a debrief on the training session
B. Have trainees train others
C. Provide opportunities to practice trained skills
D. Remove obstacles to use trained skills

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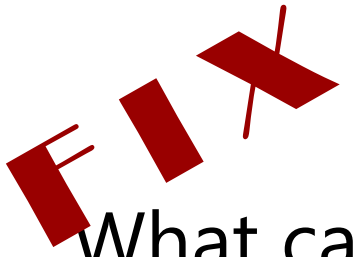

What can supervisors and team leads do after training to make transfer more likely? (Select *all* that apply)

A. Do a debrief on the training session

~~B. Have trainees train others~~ (Do they have knowledge, skills, tools, time? Will this work well?)

C. Provide opportunities to practice trained skills

D. Remove obstacles to use trained skills

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Training evaluation [is] the systematic collection of data… to [determine] whether accomplishment of those objectives resulted in enhanced performance on the job.

Kraiger, K., Ford, J. K., & Salas, E. (1993). Integration of cognitive, skill-based, and affective theories of learning outcomes to new methods of training evaluation. *Journal of Applied Psychology,* 78, 311–328. http://www.owlnet.rice.edu/~ajv2/courses/12a_psyc630001/Kraiger,%20Ford,%20&%20Salas%20(1993)%20JAP.pdf

Kraiger, K. (2002). Decision-based evaluation. In K. Kraiger (Ed.), *Creating, implementing, and maintaining effective training and development: State-of-the-art lessons for practice* (pp. 331–375).

What are good ways to find out the real effect of training? (Select *all* that apply)

A. Use knowledge checks during courses
B. Ask/watch how training helps job challenges
C. Provide desired tools that reinforce training at work, e.g. job aids
D. Support long term retention of critical information (retrieval practice)

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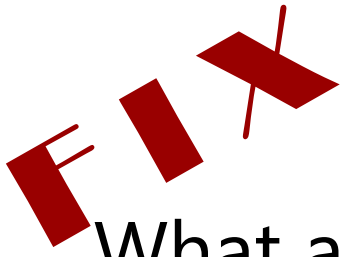

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So knowledge checks are useless?

Table 5. Checklist of Steps to Take After Training

Step	Actions	Outcome
☐ Ensure transfer of training		
☐ Remove obstacles to transfer	Ensure trainees have ample time and opportunities to use what they have learned.	Increases transfer of training and reduces skill decay. Maintains employee motivation and self-efficacy.
☐ Provide tools and advice to supervisors	Ensure supervisors are equipped to reinforce trained skills and can promote ongoing learning using on-the-job experiences.	Enables employees to retain and extend what they learned in training.
☐ Encourage use of real-world debriefs	Reflect on and discuss trainees' on-the-job experiences that are related to the training. Reinforce lessons learned, uncover challenges, and plan how to handle situations in the future.	Promotes retention, self-efficacy, and motivation. Improves job performance; promotes adequate mental models.
☐ Provide other reinforcement and support mechanisms	Consider providing trainees with job aids or access to knowledge repositories or communities of practice to reinforce and support what they learned in training.	Improves performance.
☐ Evaluate training		
☐ Clearly specify the purpose of evaluation	Determine what you hope to accomplish by evaluating the training and link all subsequent decisions back to the purpose.	Ensures that time spent evaluating training produces desired results.
☐ Consider evaluating training at multiple levels	Consider measuring reactions, learning, behavior, and results. Use precise affective, cognitive, and/or behavioral indicators to measure the intended learning outcomes as uncovered during the needs assessment.	Allows well-grounded decisions about training, including any necessary modifications. Enables effective training to continue to be supported.

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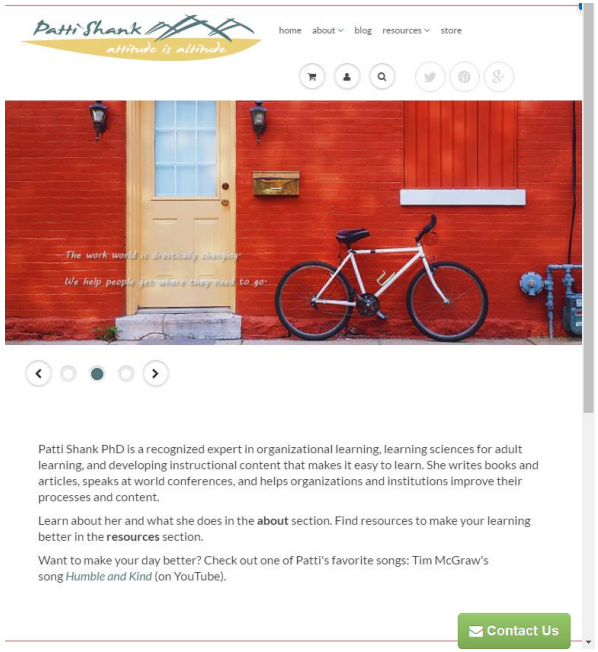

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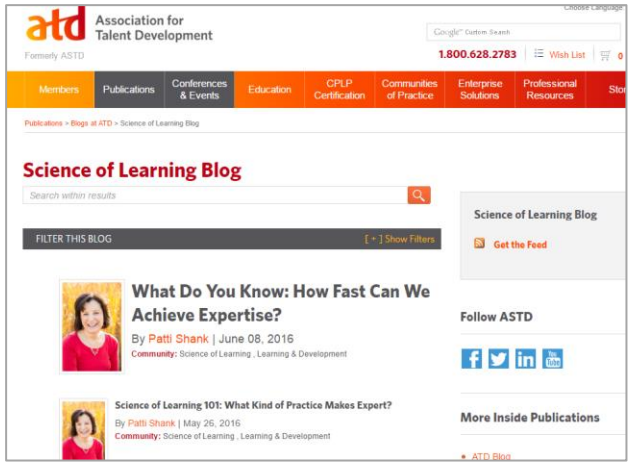

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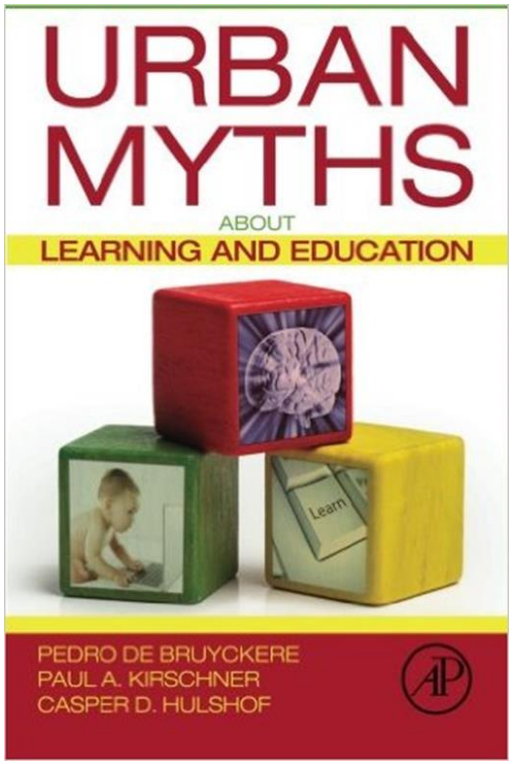

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