# The Decisive Dozen:
# Research Background Abridged

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## ABSTRACT

For decades, the workplace learning-and-performance field has found itself swamped with fads and misconceptions that harm learners and depress learning results. One of the most important sources of improvement is research. Unfortunately, research on learning is tucked away in academic journals that are essentially indecipherable to most practitioners. For research to be useful, it must be translated into clear, concise, and potent recommendations. Instead of focusing on hundreds or thousands of recommendations, practitioners need a short list of key factors to target for improvement. After 15 years of research, a dozen learning factors have been uncovered that—if implemented—can improve learning results dramatically. These "Decisive Dozen" will be detailed in a forthcoming book. This paper shares an abridged version of the research support.

## ABOUT THE AUTHOR

**Will Thalheimer** is a learning expert, researcher, instructional designer, speaker, and writer. Dr. Thalheimer has worked in the learning-and-performance field since 1985. He was the project manager for the first commercially-viable computer-based leadership simulation, The Complete Manager, back in 1986. He was project manager and simulation architect for Classroom, Inc., building simulations to teach at-risk high-school students. In 1998, Dr. Thalheimer founded Work-Learning Research to bridge the gap between research and practice, to compile research on learning, and disseminate research findings. His clients have included giant multinationals, e-learning companies, government agencies, and institutions of higher learning. His research and writings provide practical research-based recommendations through his online publications (www.work-learning.com/catalog.html), and his blog (www.willatworklearning.com). He has delivered keynote addresses for a variety of organizations, on topics from e-learning to learning measurement. The International Society for Performance Improvement honored Dr. Thalheimer with an invitation to speak in a "Masters Presentation." Will holds a BA from the Pennsylvania State University, an MBA from Drexel University, and a PhD in Educational Psychology: Human Learning and Cognition from Columbia University. He lives in Somerville, Massachusetts, with his wife, daughter, and shepherd mix.

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## INTRODUCTION

In the mid 1990's, when I worked for a premium provider of simulations and training workshops, I began having serious doubts about the industry I was working in. I noticed that my colleagues and I—in the training-and-development field— jumped from one fad to another and held on sanctimoniously to approaches that didn't work that well. I concluded that we didn't have a generally-accepted common body of knowledge to guide us. I decided—with youthful exuberance—that what was needed was someone to bridge the gap between the research side and the practice side. Both sides were doing some good work, but neither spoke to each other—they spoke different languages.

So, 15 years ago, I began a quest to uncover the most important learning factors. I was aiming for seven or so. What I figured was that if we could focus on the most important factors—the ones that were leverageable and had the most impact on learning results—we could direct our attention to those, ignore the cacophony of learning fads, and maximize the benefits of learning.

After a decade of research, exploring over 200 scientific research studies every year, I finally admitted failure, unable to come up with seven—I ended up with 12 learning factors.

I call them the Decisive Dozen, not just to give them a name, but because if we use them, they will be decisive in creating maximum learning benefits. In my forthcoming book, I'll make the following claim:

*"If you put all 12 of these factors into practice, your learning interventions are likely to be more effective than 95% of all workplace learning interventions currently being utilized!![1]"*

In the book, I will also devote a full chapter to each of the Decisive Dozen. Here, I will briefly review some of the research that supports each of the dozen items. Since I started talking about the Decisive Dozen with my clients—and then in keynote addresses, workshops, and conference presentations—I've been asked to share some of the research to support my assertions. The following is an abridged version of the research support.

One more note before I begin: You'll notice that some of the factors have more research supporting them than others. The reason for this is simple—some of the

[1] Such a bold statement demands evidence. But this is easy. Most workplace learning interventions do not utilize very many repetitions of key learning points—and yet research shows that just a few repetitions can increase learning by 100% or more. Most workplace learning interventions do not utilize very many realistic practice opportunities—and yet research demonstrates that retrieval practice is better than simple repetitions by up to 100% or more, and aligning the learning context with the retrieval context can improve results up to 50% (the context alignment is what we mean by "realistic" practice). Because most learning interventions don't give enough retrieval practice, they don't give enough feedback—and the feedback they do give is often poorly designed to be too lengthy, too immediate, and not corrective enough. Giving learners feedback properly can improve learning results easily by 50% of more. Of course, my 95% prediction is a quick-and-dirty estimate, but I hope my point is clear. Most workplace learning interventions are not currently well designed—you can easily do better by following the decisive dozen learning factors.

factors are heavily researched and easily researchable, others are less researched or less researchable.

## RESEARCH SUPPORT

**1. Content – When learners learn, they ought to learn from content that is correct and true.**

Research isn't really needed here, is it? Isn't it obvious that we want our content to be correct and true? Unfortunately, while we do find content to teach, too often we don't really have the right content. Too often we teach too much content, pushing people to forget. Too often our content is comprised of principles and concepts when it should be comprised of situations and actions. As Salas, Tannenbaum, Kraiger, and Smith-Jentsch (2012) reported in a recent review of the training-and-development field: *"The first step in any training development effort ought to be a training needs analysis (TNA)—conducting a proper diagnosis of what needs to be trained, for whom, and within what type of organizational system. The outcomes of this step are (a) expected learning outcomes, (b) guidance for training design and delivery, (c) ideas for training evaluation, and (d) information about the organizational factors that will likely facilitate or hinder training effectiveness. It is, however, important to recognize that training is not always the ideal solution to address performance deficiencies, and a well-conducted TNA can also help determine whether a non-training solution is a better alternative."* (p. 80-81) *"In sum, TNA is a must. It is the first and probably the most important step toward the design and delivery of any training."* (p. 83) *"The research shows that employees are often* ***not*** *able to articulate what training they really need"* (p. 81) so just asking them what they need to learn is not usually an effective strategy.

We do Training Needs Analysis to ensure we have the right content—because without the right content, prioritized properly—we're teaching the wrong things.

**2. Exposure – When learners need to learn, they must be exposed to the right learning content.**

Again, while this factor doesn't really require research support, it's important to note the wisdom inherent in the notion of learning exposure. First, people will learn if they are exposed to information. They may not learn it in a way that maximizes learning. They may not remember it for very long. They may not fully engage in learning. But still, learning will take place when people are exposed to information. Evidence for this comes from training research reviews that show that training does create benefits (Salas, Tannenbaum, Kraiger, and Smith-Jentsch, 2012) —even when it is not designed very well.

Of course, exposure to training is not the only way to produce learning. For example, employees can learn from experience, from their coworkers, from their supervisors. People can learn online, by reading books, by being a member of a community of practice.

As Salas, et al. (2012) remind us: *"Both traditional forms of training and technology-based training can work, but both can fail as well…"Well-designed technology-based training can be quite effective..."* (p. 87).

**3. Guiding Attention – When we guide learners' attention to the most critical information, their learning improves.**

Learners must pay attention to learn. Certainly their minds will wander from time to time, but if they are not at least somewhat attentive—and focused on critical aspects of the learning material—learning won't take place. The power of attention has been long known. Take for example William James' classic text the Principles of Psychology (1890), where he wrote, "*Only those items which I notice shape my mind*" to Gagne's First Event of Instruction, "*Gain Attention*," from his classic (1965) book *The Conditions of Learning*. But attention is not a simple phenomenon. For example, Rothkopf and Billington (1979) tracked eye movements—a measure of attention—while people were reading an instructional text. They found that attention was guided to information relevant to instructional objectives that the learners had read before they encountered the text. Moreover, this attentional effect produced profound learning results. Performance on material related to the attention-directing objectives improved by 49% and 47% over situations when learning objectives were not used. However, the material not related to the learning objectives was learned 39% and 33% WORSE than it would have been if no learning objectives were used!

What this and other studies show is that attention is a double-edged sword. If we want learners to learn something, we can't just induce general attentiveness—we have to increase their attention on the stimuli that matter. We also have to be careful not to induce attention toward irrelevant stimuli. As the research on seductive details has shown, providing interesting tidbits during learning can hurt learners in learning the targeted concepts (Garner, Gillingham, & White, 1989; Moreno & Mayer, 2000; Mayer, Heiser, and Lonn, 2001; cf. Thalheimer, 2004).

**4. Creating Correct Conceptions – When we structure learning so that learners can quickly build correct understandings, they learn more effectively and more efficiently.**

Learning must build a correct knowledge base and build it efficiently—without too much wasted time and effort. Learners must develop the right mental models of the concepts taught. There are numerous ways to help learners create correct conceptions.

For example, ensuring that prior knowledge is activated has been shown to support learning (Dochy, Segers, & Buehl, 1999). Providing learners with advance organizers produces learning benefits because it helps learners process new learning material (Corkill, 1992; Mayer, 1979; Ausubel, 1978).

Dividing whole tasks into partial tasks can help learners understand the whole task, but eventually the learners have to get whole-task practice as well. The key is that whole-task learning is beneficial, unless the whole-task procedure is too difficult or dangerous[2]. For example, whole-task training was more effective for teachers learning to make a grade book using Microsoft Excel[3]. Part-task training was found more effective than whole-task training in a pilot-display-reading simulation[4] and just as effective in an airborne-slalom-course simulator[5].

Utilizing worked examples helps learners understand concepts. Worked examples are presented to learners as problems that are solved in a step-by-step fashion. Worked examples are a proven way to help our learners develop correct conceptions. Research reviews of multiple research studies show clearly that worked examples can be effective[6]. After worked examples are presented, learners are typically given multiple practice problems to solve—and feedback is given on these practice problems. The idea that drives this approach is that worked examples help novice learners (learners new to the topic; NOT learners who are new to learning) by ensuring that their limited working-memory capacity is not overloaded during the initial stages of learning.

Providing examples and non-examples can help clarify boundary conditions for learners. *For example, Tennyson, Wooley, & Merrill (1972) found that "the best strategy for concept teaching consisted of presenting a definition, presenting matched examples and non-examples, presenting a divergent set of examples, and using an easy-to-hard sequence of examples."* (From Merrill, 2008).

Encouraging learners to explain what they are experiencing can help as well (Chi,Bassok, Lewis, Reimann, & Glaser, 1989).

In addition to the various research threads regarding creating correct conceptions, many educational processes are designed based on this concept. Questions are asked of learners, tests are given, learners are asked to perform tasks—all in the interest of finding out whether they have comprehended what they need to have comprehended.

**5. Repetition – When we provide repetitions, learners more effectively understand and remember.**

In 1885 Hermann Ebbinghaus (English translation in 1913) published his classic book on memory, which showed, among other things, that repetition strengthened learning and decreased the amount of time needed to relearn what had been forgotten. Since then, researchers have continued to find that repetition helps learning (for reviews of the verbal learning research see Crowder, 1976; Hall, 1971; Hintzman, 1976; for reviews on the role of practice in the development of expertise see Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson & Charness, 1994).

To illustrate with a short list of examples, repetition improved the performance of Morse-code telegraphers (Bryan & Harter, 1897), typists (Fendrich, Healy & Bourne, 1991), computer game players (Shebilske, Goettl, Corrington, & Day, 1999), and people using arm movements to track targets (Wulf & Schmidt, 1997). Reading something twice improved learning (Rothkopf, 1968; Barnett & Seefeldt, 1989; Bromage & Mayer, 1986; Krug, Davis, & Glover, 1990). Repeating musical melodies helped listeners remember those melodies (Gardiner, Kaminska, Dixon, & Java, 1996).

**6. Retrieval Practice – When we provide practice in memory retrieval, learners are better in future memory retrieval.**

Retrieval practice is the process in which learners retrieve information from long-term memory—after being triggered by some sort of contextual cue. Retrieval can be relatively simple, as when the cue "4 +

[2] For reviews see Naylor (1962), Stammers (1982), Wightman & Lintern (1985), Teague, Gittelman, & Park (1994).
[3] Lim, Reiser, & Olina (2009).
[4] Mattoon (1994).
[5] Goettl & Shute (1996).
[6] See Sweller, van Merriënboer, & Paas (1998).

5 =" produces the response, "9." Or it can be extremely complex, as when a confusing configuration of moving enemy combatants backgrounded by an urban landscape cues a soldier to fire his weapon toward the enemy at the second floor window. Researchers have found that retrieval practice—even when learners get no feedback—prevents forgetting (Bjork, 1988; Karpicke & Smith, 2012; Karpicke & Blunt, 2011; Roediger & Butler, 2011; Storm, Bjork, & Storm, 2010; Izawa, 1992; Rose, 1992; Allen, Mahler, & Estes, 1969; Runquist, 1983, 1986).

In addition to its power to promote remembering, retrieval practice can also benefit learners as they learn to comprehend the learning concepts by giving them feedback on how well they are doing in making decisions or taking actions.

**7. Context Alignment – When we integrate workplace cues in learning, future memory retrieval is more likely to be triggered.**

Research psychologists have found that learners will retrieve more information from memory if retrieval is done in the same context in which learning took place—as opposed to retrieval in a different context. In simple terms, learners remember more when the learning context and the retrieval context are aligned—when they utilize similar perceptual cues. The importance of learning context alignment has been found for many contextual stimuli as well: Learners remember more if they have to retrieve the information in the same room in which they learned compared to learning in a different room (e.g., Smith, Glenborg, and Bjork, 1978). Numerous examples are found in the research, including location contexts like scuba diving (Godden and Baddeley, 1975), mood contexts (Bower, Monteiro, and Gilligan, 1978; Eich, 1995; Smith, 1995), smell contexts (Herz, 1997), audio contexts (Grant, Bredahl, Clay, Ferrie, Groves, McDorman, & Dark, 1998), and music contexts (Smith, 1985). In each of these results, learners who learn in the same or similar context to the context in which they will later have to retrieve information from memory will remember more than those who learned in a different context.

These varied results show that context—whether it is environmental, emotional, or physiological—can provide cues that aid future retrieval of learned information. Or to look at this from the reverse perspective, if we utilize cues in the learning context that will be present in the on-the-job performance context—and have learners attend to those cues appropriately during learning—then our learners will be more likely to later remember what they learned. These results suggest the importance of using physical, real-world tools in training, like radios, command boards, and equipment.

To summarize, when the learning and retrieval contexts are aligned, more remembering will occur (for reviews see Bjork & Richardson-Klavehn, 1989; Smith, 1988; Smith & Vela, 2001; Eich, 1980; Roediger & Guynn, 1996; Davies, 1986).

**8. Feedback – When we utilize feedback appropriately, we correct learners' misconceptions and support correct retrieval.**

Simulations often require learners to make decisions about what actions to take, opening up the possibility to give learners feedback on their decisions—either within the fiction of the simulation or as didactic feedback coming from outside the simulated environment. Feedback is one of the most potent learning factors because it corrects misconceptions that learners have (Thalheimer, 2008a, 2008b). Studies that compare feedback to not giving feedback generally find improvements with feedback—sometimes small but oftentimes quite substantial improvements (Butler, Karpicke, & Roediger, 2007, 2008; Pashler, Cepeda, Wixted, & Rohrer, 2005; Brosvic, Epstein, Dihoff, & Cook, 2005; Kang, McDermott, & Roediger, 2007; Karraker, 1967; Kulhavy & Anderson, 1972; Kulhavy, Yekovich, & Dyer, 1976; Surber & Anderson, 1975; Sturges, 1978; Clariana, Ross, & Morrison, 1991; Webb, Stock, & McCarthy, 1994).

Feedback supports two learning goals (Thalheimer, 2008a, 2008b). First, it helps learners build correct mental models as they build an understanding on a new topic. Second, it supports correct retrieval practice, which supports long-term remembering.

**9. Variation – When we vary the learning materials, learners stay more engaged and memory retrieval is improved.**

As any training professional will tell you, it's critical to vary one's delivery approach in the classroom—or learners will zone out. Research backs up these intuitive insights—providing learners with variations and variability really helps to spur learning. For example, Barcroft and Sommers (2005) [7] found that

[7] (Barcroft & Sommers, 2005). They found similar results for different voice types (e.g., nasal, elongated, whispered, high-pitched, etc.), showing benefits of

 

learners learning second-language vocabulary learned more, by 24% and 41%, when they heard the second-language words from different speakers rather than from the same speaker. Isn't that remarkable? Just by varying the speaker's voice, learners learned more.

Similarly, Quilici and Mayer (1996) found that learners who got examples with more varied background contexts did better by 13% over learners who got examples with the same background context[8]. The variability in this research helped the learners see the underlying meaning of the examples, helping them see beyond the surface characteristics of the examples.

Variability has even been shown to benefit groups working together in learning. For example, management science researchers had groups of three people learn to play the game of Go, either by playing only Go or by playing Go and another game (Schilling, Vidal, Ployhart, & Marangoni, 2003). The groups learning together could utilize their 10 hours of learning focusing only on Go, or by focusing on Go and another game. The other games were either related to Go (Reversi) or unrelated (Cribbage). Amazingly, even though they spent about twice as much time practicing Go, the group that utilized their 10 hours by playing only Go, did not do as well as the group that utilized their 10 hours split between Go and Reversi, the related game. The Go-and-Cribbage group did not differ significantly from the Go-Only group. So here again, we see the benefits of variable learning contexts—and the effect seems to generalize to individuals working in groups.

Variation seems to be fundamental to human learning—even having an effect on infants as young as 14 months. When different speakers pronounced the names of objects, human infants were better able to discriminate between similar phonemic sounds compared to infants who heard the names of the objects from single speakers (Rost & McMurray, 2009).

**10. Spacing – When we space repetitions of content over time, future memory retrieval is improved.**

Over 300 studies were done on the spacing effect in the 20th Century (Bruce and Bahrick, 1992). At regular intervals, some experimental psychologist reviews the research on the spacing effect and announces that it is one of the most robust findings in all of psychology (e.g., Kornell, Castel, Eich, & Bjork, 2010; Donovan & Radosevich, 1999; Lee & Genovese, 1988; Ruch, 1928; Cain & Willey, 1939; Melton, 1970; Crowder, 1976; Hintzman, 1974; Glenberg, 1979; Rea & Modigliani, 1988; Dempster, 1988, 1989; 1996). Bahrick and Hall (2005) put it this way: "*the spacing effect is one of the oldest and best documented phenomena in the history of learning and memory research.*" Surprisingly, while it is one of the best documented phenomena, the spacing effect has also been one of the least known or appreciated in the fields of instructional design and education (Dempster, 1988). Recently this seems be changing—evidenced by the number of web-based programs that provide spaced repetitions.

The spacing effect has been found in a wide array of experimental situations, illustrating its general applicability. It has been found in in multimedia simulations (e.g., Shebilske, Goettl, Corrington, & Day, 1999), in list-learning experiments (e.g., Melton, 1970; Verkoeijen, Rikers, & Schmidt, 2005),in classroom situations (e.g., Sobel, Cepeda, & Kapler, 2011; Pyle, 1913, Austin, 1921), in learning textual material—both visual and auditory (e.g., Zulkiply, McLean, Burt, & Bath, 2012), in vocabulary learning (e.g., Dempster, 1987a), in learning vocabulary in a foreign language (e.g., Bahrick, 1979; Bahrick & Phelps, 1987; Bahrick, Bahrick, Bahrick, & Bahrick, 1993), in programmed instruction (e.g., Reynolds & Glaser, 1964), in learning word pairs (e.g., Karpicke, & Bauernschmidt, 2011), in reading (e.g., Krug, Davis, & Glover, 1990; Rothkopf & Coke, 1963), in using chapter summaries (Reder & Anderson, 1982), in advertising research (e.g., Singh, Mishra, Bendapudi, and Linville, 1994) and even in remembering the street names where one went to college (Bahrick, 1979). Similarly, the spacing effect has been found with young adults, old adults, and children as young as preschool (e.g., Kornell, Castel, Eich, & Bjork, 2010; Rea & Modigliani, 1987; Toppino, 1991; Singh, Mishra, Bendapudi, & Linville, 1994; Kausler, Wiley, & Phillips, 1990).

**11. Persuasion – When we persuade learners about the importance of what they are learning, they will be more likely to reinforce memory accessibility and persevere during future on-the-job implementation attempts.**

Learners are not like computers. They don't just swallow information whole. They contemplate it and evaluate it before they accept it. Even if they accept it

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24% and 20%--again indicating that variation is beneficial in support of learning.

[8] Quilici & Mayer, 1996). The improvements cited reflect Experiment 3. All three experiments, taken together, show that variable background contexts in examples seem to help learners focus on deep levels of meaning—rather than focusing only on the surface characteristics of those problems.

as true, they still may need to be persuaded to do the difficult work of putting their new learning into practice on the job.

Interestingly, we in the training field have too much respect for logic and argument. We tend to believe that evidence and good arguments will convince our learners to accept learning concepts and be motivated to put them into practice. But the reality of human cognition tells a different story. Presenting people with information that goes against their previously-held beliefs is most likely to push them to hold their views even more strongly than they held them before we intervened. Research has shown this clearly.[9] For example, campaigns to lower the rates of smoking can actually increase the rates of smoking.[10] Conservatives who were shown evidence that Saddam Hussein—leader of Iraq at the time the United States invaded Iraq in 2003—did not have weapons of mass destruction (WMD); were subsequently more likely to believe he had WMDs.[11] Those who were most wrong in their beliefs about welfare, were least likely to be swayed by evidence to the contrary.[12] These findings should send chills up your spine. We can't just present facts and evidence and assume that we will be persuasive. We must do more.

There are many intriguing findings in the persuasion literature that apply to our work as providers of learning interventions. People are more influenced when an interaction is personal than when an interaction is impersonal. For example, in one recent experiment[13], people who were asked to complete an onerous 24-page survey were 67% more likely to complete it if the survey was affixed with a Post-It® note that had their name on it than if they got a Post-It note that wasn't personalized[14]. People are more influenced by people who they like. More specifically, people tend to like people who pay them compliments—and are more influenced by them—even if they know the compliments are not authentic[15]. People tend to like people who are more attractive[16]. A meta-analysis of the beauty research[17]shows that attractive people are not only judged more competent in their occupations but they are treated better as well. Unattractive people even take a hit by earning less than the average worker and 12-14% less than their good-looking colleagues[18]. These tendencies don't depend on gender, age, or even how familiar people are to us. We tend to treat good-looking people better than less-attractive people. And this tendency starts in childhood. We tend to trust people more who are judged to have more attractive faces[19]. Finally, and most importantly, better looking people are also more persuasive[20].

People are more influenced by people who they feel are more similar to them[21]. For example, they are more influenced by their friends[22]. We already cited a research study that found that people were more likely to be influenced by someone with the same first name when they could read the name of the other person from a nametag. People tend to like people who are more similar to them as well—and also are more influenced by those who are similar[23]. This finding is not some weird socialization scheme learned by adults. In fact, the tendency to prefer people who are like us has been found in children as young as 9 and 14 months of age.[24] We humans seem hard-wired to prefer and trust others who are like us. People are also more likely to be persuaded by other people who treat them well or do them favors[25]. Psychologists call this the reciprocity principal[26]. Exchanging favors—doing favors for and getting favors from another person—activates our "friendship heuristic" and increases the likelihood that we will assist the other person[27].

All these truisms about human nature can be parlayed into improved learning results. For example, trainers can be chosen who have similar backgrounds to the folks they are teaching. They can highlight their similarities. They can tailor their appearance to be

[9] (for example, Nyham & Reifler, 2010; Schwartz, Parker, Hess, & Frumkin, 2011; For wonderful review of how people become misinformed, and how such misinformation can be corrected, see Lewandowsky Ecker Seifert Schwarz, & Cook, 2012)
[10] (Byrne & Hart, 2009, as cited in Lewandowsky Ecker Seifert Schwarz, & Cook, 2012)
[11] (Nyham & Reifler, 2010)
[12] (Kuklinski, Quirk, Jerit, Schwieder, Rich, 2000)
[13] (Garner, 2005)
[14] (Garner, 2005, Post-It® Note Persuasion)
[15] (Drachman, DeCarufel, & Insko, 1978)
[16] (Olson & Marchuetz, 2005)
[17] (Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000)
[18] (Hammermesh & Biddle, 1994)
[19] (Wilson & Eckel, 2006)
[20] (Chaiken, 1979)
[21] (Heider, 1958)
[22] Frenzen & Davis (1990) showed how some buying decisions—like those at a Tupperware party—were attributed more to friendship relationships than to product attributes.
[23] (Byrne, 1971)
[24] (Hamlin, Mahajan, Liberman, & Wynn, 2013)
[25] (Whatley, Webster, Smith, & Rhodes, 1999)
[26] (Gouldner, 1960)
[27] (Burger, Ehrlichman, Raymond, Ishikawa, & Sandoval, 2006)

more attractive. They can go out of their way to be helpful. They can personalize the learning experience.

The same thing goes for e-learning. Better production values exude more credibility and thus more persuasion. Personalized language—instead of stuffy formal language—will be more persuasive. Including testimonials from folks with the same job as the learners can motivate and persuade.

**12. Perseverance – Most meaningful learning requires that learners persevere over time with energetic goal-directed metacognitive effort; whether that effort is utilized in training or in on-the-job self-directed learning.**

After training, we send our fresh-faced learners off to the workplace battlefield. They are met immediately with demands and distractions, resistance and cut supply lines. Ideally, they should be working with a platoon of others. But mostly they are on their own in enemy territory. Attempts to put learning into practice can easily be overrun by a marauding army of urgent priorities. Certainly, our learners should be helped by their bosses and colleagues, but still, they often have to go it alone. It is in each learner's fragile cognitive rucksack that the learning battle plan is hidden. In short, for our learners to succeed, they need to persevere over time—and part of that perseverance has to come from within.

As Salas, et al. (2012) say: *"The extent to which trainees perceive the posttraining environment (including the supervisor) as supportive of the skills covered in training had a significant effect on whether those skills are practiced and maintained."* (p. 88) *"Even when trainees master new knowledge and skills in training, a number of contextual factors determine whether that learning is applied back on the job: opportunities to perform; social, peer, and supervisory support; and organizational policies."* (p. 90)
*Researchers reported that team leaders are a key to learning on the job. These leaders can greatly influence performance and retention. In fact, we know that leaders can be trained to be better coaches…Organizations should therefore provide tools, training, and support to help team leaders to coach employees and use work assignments to reinforce training and to enable trainees to continue their development."* (p. 90)

While there are many strategies that support perseverance, a few stand out. First, we need to get learners' supervisors to support learning (both training-based learning and learning on the job).

Second, we can also inoculate learners to the obstacles they may face. Researchers have found that presenting people with counterarguments to their views actually inoculates them against further counterarguments[28]. That is, they tend to stay persuaded in the face of resistance more often if they've been presented with counterarguments. The inoculation notion is based on the medical analogy of inoculation against disease. Just as we might inoculate our children against measles, we might inoculate our learners against the many forces that would lessen their beliefs.

There is evidence that inoculation can wane with time, so if long-term persuasion is required, extra measures may be critical. Booster shots have been suggested[29], but the research base is somewhat unclear about their effectiveness[30]. Fortunately, inoculation appears to work even if people are buffeted with multiple persuasive attacks[31].

Interestingly, to create an inoculation effect, we don't have to present direct counterarguments against the arguments used before. It appears that we can use any counterargument against the belief itself[32]. We might be stunned by this if we think of humans as mechanistically logical. But again, humans are more complicated. It appears that the counterarguments work because they entice people to actively refute those counterarguments by specifically strengthening their beliefs.

Finally, we can prepare learners to persevere by teaching them persuasion skills, teaching them change-management skills, and helping them build communities of practice to garner mutual support.

**Summary**

The Decisive Dozen represent some of the most potent learning factors there are. If baked into our learning designs, we will create maximally effective learning.

[28] (McGuire, 1961; McGuire & Papageorgis, 1961; Ivanov, Pfau, & Parker, 2009)
[29] (McGuire, 1961)
[30] (Ivanov, Pfau, & Parker, 2009)
[31] (Ivanov, Pfau, & Parker, 2009)
[32] (McGuire & Papageorgis, 1961; Banas & Rains, 2008)

## CONCLUSION

While there are hundreds if not thousands of learning factors that can influence learning outcomes, some of those factors are more important than others. The Decisive Dozen have been selected—based on the research—because they are critical to learning. The deep and wide-ranging research studies reported here are a testament to the potency of these dozen factors.

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