EVIDENCE-BASED
TRAINING METHODS
2ND EDITION
A Guide for Training Professionals
RUTH COLVIN CLARK
EVIDENCE-BASED TRAINING METHODS

2ND EDITION

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Acknowledgments

It bears saying that without evidence, we would not have evidence-based guidelines for practice. The evidence in this book comes from the work of hundreds of instructional research scientists located throughout the world. If you check the references at the end of the book, you will see that a large percentage of them include Richard E. Mayer and the OPWL 547 Advanced Instructional Design students, whose ongoing research program in multimedia learning is reflected throughout this book.

I owe special thanks to Steve Villachica, associate professor from Boise State University. Steve used the first edition of this book as a text and was kind enough to set up a discussion board for students to add suggestions for revisions.

Juana Llorens, former manager of ATD Learning and Development Community of Practice, has been a strong supporter of evidence-based practice in workforce learning. Among other efforts she has established a track of Research in the Learning and Instructional Sciences. Conference presentations, whitepapers, webinars, and blogs are just a few of the products of her efforts.

I wish to thank Ashley McDonald and Melissa Jones and the talented editorial and production staff at ATD Press.

Finally the support of my family is most important, including my husband Pete Sattig, daughters Kathryn Arsenault and Diane Bovy, and their always inspiring children: Joshua, Matthew, Lennon, and Luke.
WHAT PROMPTED A SECOND EDITION OF THIS BOOK?

I wrote the first edition of *Evidence-Based Training Methods* because there is a large repository of reports from research scientists in the academic literature. I believed then and today that much of this evidence remains unknown to practitioners. The academic research professionals and workforce learning practitioners constitute two quite separate communities of practice. There is little overlap in their publications and conferences. Most practitioners lack the time to search, read, and synthesize the many research reports available. Second, although many research papers do give some guidance for practitioners, guidance is not their main goal. I believe practitioners need not only guidelines, but also examples and counter examples for implementing those guidelines.

Naturally, research continues to evolve. Fortunately for me, the science of instruction and learning does not move as quickly as medical research for example. However, many of the guidelines in the first edition needed updating. I was happy to find in my research a sufficient body of evidence to warrant a new chapter on games. I am encouraged also by a continued interest in evidence-based guidelines among practitioners—especially those in the allied health professions stimulated by the focus on evidence-based medicine. Finally, what author does not look back on her previous writing and not want to improve it? A second edition has offered me the opportunity to pursue all of these goals.
What’s in This Book?

The chapters are organized from smaller to larger instructional elements. Following the introductory chapters in part 1, part 2 summarizes evidence on use of the basic modes for communication, including graphics, text, and audio. Part 3 looks at evidence regarding two important instructional methods: examples and practice. Finally in part 4 I take a more macro view of lesson design with guidelines for explanations, teaching procedures, and building critical thinking skills. The book ends with a chapter on games and a short summary of some principles that go beyond the evidence discussed in individual chapters.
Each chapter includes questions about the instructional method, evidence to support those questions, guidelines based on the evidence, and a short checklist of best practices. If you want a quick overview, go to the Appendix to see a synopsis of guidelines and then go back to the specific chapters that discuss those guidelines in detail.

Finally, I offer you engagement opportunities through chapter lead-in questions and periodic evidence interpretation questions. Because you are in control, you can bypass these elements and go directly to the meat of the chapter.

**Limits of the Book**

There are many areas of interest in our field and you might wonder why certain topics are not addressed. For example, motivation is an important issue not included. My selection of topics is guided by the evidence available and by my ability to create a coherent set of guidelines around that evidence. There is in fact a great deal of material on motivation. And we are starting to see more measures of motivation in learning research. However as of this writing I did not find a clear set of guidelines to inform practice.

No one person can claim to be cognizant of all relevant evidence, so I apologize for any omissions. Nor can I claim a flawless interpretation of the evidence I do review. Some research scientists would feel that my guidelines exceed the evidence provided. In this edition I cited the evidence sources more rigorously than in the first. Intellectual integrity demands it. But the citations also provide you the opportunity to review the evidence firsthand and draw your own conclusions.

I welcome your comments.

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TRAINING FADS AND FABLES

Blood, Phlegm, and Black and Yellow Bile

Training Mythology and Investments in Learning

Training Myth 1: Learning Styles
Training Myth 2: Media Panaceas
Training Myth 3: The More They Like It, the More They Learn
Training Myth 4: Learners Know What They Need
Training Myth 5: Active Engagement Is Essential to Learning
Training Myth 6: Games, Stories, and Simulations

Promote Learning
“At any given daylight moment across America, approximately 660,000 drivers are using cell phones or manipulating electronic devices while driving, a number that has held steady since 2010.”

“Engaging in visual-manual subtasks (such as reaching for a phone, dialing and texting) associated with the use of hand-held phones and other portable devices increased the risk of getting into a crash by three times.” (Statistics drawn from the National Highway Traffic Safety Administration and Virginia Tech Transportation Institute, cited on distraction.gov, 2014).

Do you talk on your cell phone while driving? If yes, you are among the 66 percent of drivers who do. However, similar to seat belt use, your cell phone use may soon change. Evidence shows that even hands-free cell phones are potentially lethal distractions, putting you at four times greater risk of a crash. As of early 2009, when the first edition of this book was written, only five states had banned handheld phones while driving. No state completely banned all types of cell phone use. As of early 2014, 12 states had banned handheld cell phones and 41 had banned texting. Are you surprised that in the past five years the number of states banning cell phone use more than doubled, but still totals less than 25 percent of all states?

The journey from evidence to application of evidence is often slow and workforce learning is no exception. In this chapter we will see how applying evidence to your instructional programs and products can save your organization time and money that could be wasted on training fads that don’t work.
BLOOD, PHLEGM, AND BLACK AND YELLOW BILE

Our story starts in the early 1600s—the birth years of evidence-based practice. Prior to 1628, people believed that blood was produced by the heart and liver and was continuously used up by the body. In other words, there was no accurate conception of blood circulation. William Harvey introduced the revolutionary idea that blood was not consumed by the body. Based on measures of blood volume and anatomical observations, he proposed that blood was pumped from the heart and circulated throughout the body, returning again to the heart. Harvey—along with Galileo, Descartes, and others—turned the 17th-century world upside down by advocating evidence and reason, rather than traditional wisdom and faith, as the basis for knowledge and decisions.

We’ve come a long way from the days when medical diagnosis and treatments were based on a balance of the four body humors of blood, phlegm, and black and yellow bile. If you were lucky, your treatment was an amulet that at least did no harm. If you were not so lucky, you were subjected to bloodletting. Although great strides were made in medical science, more than 400 years passed before health science professionals formally adopted evidence-based practice. Old habits die hard. Even though we’ve seen evidence about the dangers of cell phones while driving for more than 10 years, that data are just starting to be reflected in policy changes. To see the latest updates on cell phones and driving laws, visit the Governors Highway Safety Association website.

What Do You Think?

See how your current knowledge matches up with evidence. Check off each statement you think is true:

- A. To accommodate different learning styles, it’s best to explain a visual with words presented in text and in audio.
- B. Instructor-led classroom training results in better learning than computer-delivered instruction.
Evidence-Based Training Methods

C. Courses that get higher student ratings generally produce better learning outcomes.
D. Learners make accurate decisions about their instructional needs.
E. Active engagement is essential to learning.
F. Games are effective instructional methods.

TRAINING MYTHOLOGY AND INVESTMENTS IN LEARNING

How much do you think is invested in workforce learning? You might be surprised to learn that in 2012 the United States allocated around $164 billion to workforce learning (ASTD, 2013). No doubt the organizations you work for make large investments in training. What kind of return does your organization get on its training investment? Think of the last class that you developed or facilitated. To what extent did the content sequencing, training methods, and facilitation techniques of that class promote learning? Many common training practices are based more on fads and fables than on evidence of what works. Let’s look at the facts behind six popular training myths.

TRAINING MYTH 1: LEARNING STYLES

Are you a visual or auditory learner? Has your organization invested resources in learning styles? Like the four body humors of blood, phlegm, and black and yellow bile, learning styles represent one of the more wasteful and misleading pervasive learning myths of the past 25 years. From audio learners to visual learners or from “sensors” to “intuitives,” learning styles come in many varieties. And learning styles have been a profitable concept. Including books, inventories, and classes, many resources have been devoted to learning styles. For some reason, the idea of a “learning style” has a charismatic intuitive appeal. Ask almost anyone whether he or she is a visual
learner or a verbal learner and you will get an immediate commitment to a specific “learning style”!

The learning style myth leads to some very unproductive training approaches contrary to the modern evidence of what works. For example, many trainers believe that visuals should be described by words in text format for visual learners and narration mode for auditory learners. To accommodate visual and auditory learners, a visual on a screen is explained with text and audio narration of that text. As we will see in chapter 6, evidence has shown this practice to depress learning.

The time and energy spent perpetuating the various learning style myths can be more wisely invested in supporting individual differences that are proven to make a difference—namely, prior knowledge of the learner. If you make one change as a result of reading this book: Give up the learning style myth!

Evidence About Learning Styles

Do we have any evidence about learning styles? Kratzig and Arbuthnott (2006) calculated the relationship among three learning style indicators. They asked a group of university students to do three things. First, participants rated their own learning style as visual, auditory, or kinesthetic. Second, the individuals took a learning style test that classified them as a visual, auditory, or kinesthetic learner. Finally, they were given three tests to measure visual memory, auditory memory, and kinesthetic memory. If the learning style concept had substance, we would expect to find some positive relationships among these measures. For example, someone who considered herself a visual learner would score higher on the visual index of a learning styles test and have better memory for visual information. However, when all of the measures were compared, there were absolutely no relationships! A person who rated himself an auditory learner was just as likely to score higher on the kinesthetic scale of the learning style test and show best memory for visual data. The research team concluded: “In
contrast to learning style theory, it appears that people are able to learn effectively using all three sensory modalities” (241).

Another research study focused on sensing versus intuitive learning styles. Cook et al. (2009) compared learning of medical residents who tested as having a sensing learning style with individuals who tested as having an intuitive learning style. Each resident completed four web-based training modules. Half the lessons started with a clinical problem followed by traditional information. The other half reversed the sequence, starting with information and ending with a clinical problem. Sensing learners should learn better with a case-first approach, while intuitive learners should learn better from a traditional rule-example approach. Knowledge tests were administered at the end of each module, as well as several months later. As in the experiment described previously, there was no association between learning style and instructional method. The research team concluded: “It appears from the preponderance of evidence that sensing-intuitive styles have little impact, if any, on educational outcomes” (88).

A comprehensive review by Pashler and others (2008) concludes that while people do differ regarding aptitudes, “at present there is no adequate evidence base to justify incorporating learning-styles assessments into general educational practice. Thus limited education resources would better be devoted to adopting other educational practices that have a strong evidence base, of which there are an increasing number” (105). In short, a review by Riener and Willingham (2010) concluded: “There is no credible evidence that learning styles exist” (33).

The lack of evidence about learning styles is the basis for my first recommendation.

**Fads & Fables Guideline 1:**

Do not waste your training resources on any form of learning style products, including instructor training, measurement of learning styles, or books.
Chapter 1: Training Fads and Fables

TRAINING MYTH 2: MEDIA PANACEAS

Only a few years ago, computer-delivered instruction incited a revolution in training. Of course computers were not the first technology to cause a stir. Decades prior to computers, radio, film, and television were hailed as having high potential to revolutionize education. The first widespread dissemination of computer-based training (CBT) was primarily delivered on mainframe computers. Soon, advances in digital memory, display hardware, programming software, and Internet distribution catalyzed the rapid evolution of CBT to recent technological panaceas, including web-based training, social media, digital games, simulations, and mobile learning to name a few. With each new technology wave, enthusiasts ride the crest with claims that finally we have the tools to really revolutionize learning. And yet, if you have been around for a few of these waves, those claims begin to sound a bit hollow. In just a few years, the latest media hype of today will fade yielding to the inexorable evolution of technology and a fresh spate of technological hyperbole.

What’s wrong with a technology-centric view of instruction? Instructional scientists have learned a lot about how humans learn. Like Harvey who gave birth to the modern mental model of blood circulation, instructional psychology has revealed the strengths and limits of a human brain that is the product of thousands of years of evolution. When we plan instruction solely to leverage the latest technology, we ignore the psychology of human learning, which, as we have learned again with cell phones and driving, has severe limits. In fact, technology today can deliver far more information faster than the human brain can absorb it.

Evidence Against the Technology Panacea

For more than 70 years, instructional scientists have attempted to prove the superiority of each new technology over old-fashioned classroom instruction. One of the first media comparison studies was published in the 1940s. The U.S. Army believed it could improve instructional quality and reliability by replacing many instructors with films. To their credit, before
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setting policy based on this idea, the Army tested it. They compared learning a simple procedure from a lesson delivered by film, by instructor, and by print. Each version used similar words and visuals. What do you think they found?

- Instructor-led training led to the best learning.
- Paper-based, the least expensive, led to the best learning.
- Films could replace instructors, because they led to the best learning.
- Learning was the same with instructor, print, and film.

The Army discovered that participants from all three lesson versions learned the procedure equally well. In technical terms, we say that there were “no significant differences in learning” among the three groups. Since that early experiment, hundreds of studies have compared learning from classroom instruction with learning from the latest technology—the most recent being various forms of digital distance learning. In fact, so many media comparisons have been published, that a synthesis of all of the results, called a meta-analysis, found the same basic conclusion that the Army reported so many years ago: no major differences in learning from classroom lessons compared to electronic distance learning lessons (Bernard et al., 2004; U.S. Department of Education, 2010).

But wait! There is an important caveat to this conclusion. The basic instructional methods must be the same in all versions. In other words, if the classroom version includes graphics and practice exercises, the computer version must include similar graphics and practice opportunities. That’s because the psychological active ingredients of your lessons are what cause people to learn, regardless of what media you are using. Rather than asking which technology is best for learning, you will find more fertile ground by using a blend of media that allows you to space out learning events, provide post-training performance support, and foster synchronous and asynchronous forms of collaboration. In fact, the U.S. Department of Education found a significant learning advantage to courses using media blends compared to pure classroom-based or pure online learning (2010).
What About Social Media?

There’s a lot of buzz about social media, including wikis, blogs, multimedia shared pages, Twitter, and so on. What evidence do we have for the benefits of these web 2.0 technologies for learning? A review by Hew and Cheung (2013) concluded that actual evidence regarding the impact of web 2.0 technology on learning is fairly weak (so far). As in reviews of older media, the positive effects reported to date are not necessarily attributed to the technologies per se but rather to how those technologies are used. We need a taxonomy of web 2.0 technologies that describes best practices for each based on valid data.

The more than 70 years of media comparison research is the basis for my second recommendation.

Fads & Fables Guideline 2:

Ignore panaceas in the guise of technology solutions in favor of applying proven practices on the best use of instructional methods to all media you use to deliver training. Select a mix of media that supports core human psychological learning processes.

As a postscript to this media discussion, what were once considered distinct and separate delivery technologies are increasingly converging. For example, we now have online access to multiple instructional resources. Handheld mobile devices merge functionalities of computers, newspapers, telephones, cameras, radios, clocks, and context-sensitive performance support to name a few. Perhaps the media selection discussion will evolve into a discussion of instructional methods, most of which can be delivered via a mix of digital media and in-person instructional environments.
TRAINING MYTH 3: THE MORE THEY LIKE IT, THE MORE THEY LEARN

Do you collect student ratings at the end of your courses? More than 90 percent of all organizations use end-of-training surveys to gather participant evaluation of the quality of the course, the effectiveness of the instructor, how much was learned, and so on. These rating sheets are commonly called smile sheets or Level 1 evaluations. If you are an instructor or a course designer, chances are you have reviewed ratings sheets from your classes. You might also have a sense of how much learning occurred in that class. Based on your own experience, what do you think is the relationship between participant ratings of a class and the actual learning that occurred?

- Classes that are higher rated also yield greater learning.
- Classes that are higher rated actually yield poorer learning.
- There is no relationship between class ratings and learning from that class.

To answer this question, researchers have collected student satisfaction ratings as well as lesson test scores that measure actual learning. They then evaluated the relationships between the two. For example, they considered whether higher ratings correlated with more learning or less learning.

Evidence on Liking and Learning

A meta-analysis synthesized more than 1,400 student course ratings with student test data. Sitzmann et al. (2008) found a positive relationship between ratings and learning. But the correlation was very small. In fact, it was too small to have any practical value. Specifically, the research team concluded, “Reactions have a predictive relationship with cognitive learning outcomes, but the relationship is not strong enough to suggest reactions should be used as an indicator of learning” (289).

Do you think that learners rate lessons with graphics higher than lessons without graphics? Do you think that lessons with graphics support
better learning than lessons without graphics? Sung and Mayer (2012b) compared student ratings and learning from lessons that included 1) relevant graphics, 2) distracting graphics, 3) decorative graphics, and 4) no graphics. They found that all of the lessons with graphics got better ratings than lessons lacking visuals, even though only the relevant graphics led to better learning. In other words, there was no relationship between liking and learning. We’ll look at evidence on graphics and learning in more detail in the next chapter.

Besides graphics, what factors are associated with higher ratings? The two most important influencers of ratings are instructor style and human interaction. Instructors who are psychologically open and available—in other words, personable instructors—are associated with higher course ratings. In addition, the opportunity to socially interact during the learning event with the instructor as well as with other participants leads to higher ratings (Sitzmann et al., 2008).

Evidence from comparisons of hundreds of student ratings and student learning is the basis for my third recommendation.

Fads & Fables Guideline 3:
Don’t rely on student ratings as indicators of learning effectiveness. Instead, use valid tests to assess the pedagogical effectiveness of any learning environment. Focus on instructional methods that support liking and learning.

TRAINING MYTH 4: LEARNERS KNOW WHAT THEY NEED
One of the potential benefits of e-learning is the opportunity to offer environments that move beyond “one size fits all” instruction typical of instructor-led training. Most e-learning courses offer learners choices—choices over which lessons they may want to take in a course, whether to study an
example or complete a practice exercise, as well as the amount of time to spend on a given screen. Online asynchronous e-lessons with these options are considered high in learner control. How effective are high learner control courses? Do your learners make good decisions regarding how much to study, what to study, or which instructional methods to select?

**Evidence on Learner Decisions**

More than 20 years of research comparing learning from courses that are learner controlled with courses that offer fewer choices concludes that quite often, learners do not make good instructional decisions. Many learners may be overly confident in their knowledge and therefore skip elements that in fact they need. A case in point: Hegarty and her associates (2012) asked subjects to compare wind, pressure, or temperatures on either a simple or more complex weather map. The more complex map included geographic detail, as well as multiple weather variables not needed to complete the assignment. Task accuracy and efficiency was better on the simpler maps. However, about one-third of the time, the subjects chose to use the more complex maps to complete the task.

Dunlosky and Rawson (2012) provided technical term definitions and asked 158 students to judge their level of confidence in recalling the definition correctly. When participants judged their response as correct, it was actually correct only 57 percent of the time. In other words, they were overconfident in their knowledge. Participants were asked to repeat the definitions until they judged their responses correct three times. Following a recall test two days later, the researchers separated students based on their level of overconfidence and compared their final test scores. Participants who were most overconfident retained fewer than 30 percent of the definitions, whereas those who showed little overconfidence during study retained nearly all of the definitions they had practiced. The authors conclude that judgment accuracy matters a great deal for effective learning and durable retention: Overconfidence leads to the premature termination.
of study and to lower levels of retention. When left to their own devices many students use ineffective methods to monitor their learning, which can produce overconfidence and underachievement.

A third study focused on more advanced students, internal medicine residents. Residents predicted their overall performance one week before taking a medical knowledge exam. Residents were highly inaccurate in predicting their performance. Only 31 percent scored within 10 points of their predictions. Rather than being overly confident, most were pessimistic, with 69 percent underestimating their performance (Jones, Panda, and Desbiens, 2008). The general conclusion is that many learners do not make accurate assessments of their learning and thus do not make accurate or efficient choices regarding what and how to study.

**Optimizing Learner Control in E-Learning**

One way to improve learning outcomes in self-study e-learning is to make important topics and instructional methods, such as examples and practice, a default rather than an option to be selected (Schnackenberg and Sullivan, 2000). In a default lesson, the “continue” button automatically leads to important instructional methods and the learner will have to consciously choose to bypass them. In addition consider ways to guide learners at the start and throughout a course or lesson. For example, ask a few job-related questions about their experience with the task or knowledge that is the focus of the lesson. Provide advisement based on the responses to these questions. Keep in mind that many learners new to the content will not make accurate self-assessments of their own knowledge and skills and over confidence will lead to underachievement.

An exception to this guideline is pacing through a lesson. Control over pacing with forward and backward buttons should be available to all learners allowing them to manage their rate of progress. For more information on learner control, see chapter 14 in Clark and Mayer (2011) and chapter 21 in Mayer (2014a).
Fads & Fables Guideline 4:
Don’t count on your learners to always make good decisions about their instructional needs. If your course builds in options, accompany those options with guidance.

TRAINING MYTH 5: ACTIVE ENGAGEMENT IS ESSENTIAL TO LEARNING

“Active learning” is one of the most cherished laws of workforce learning. As a response to the pervasive use of noninteractive lectures, the training community has pushed active learning as an essential ingredient of effective instruction. By active learning, trainers and facilitators refer to overt behavioral activities on the part of learners—activities such as making content outlines, collaborating on problems, or completing practice activities. However, the evidence points to a more nuanced definition of active learning. Engagement is essential; but it is psychological engagement rather than physical engagement that counts. And physical engagement can sometimes interfere with psychological engagement.

The Evidence on Active Engagement

Imagine two groups of learners studying a biology chapter. Group A is provided with a concept map developed by the chapter author as a support guide. Group B is provided with a blank concept map, which the learners are asked to fill in as they read. Clearly, Group B is more actively engaged in learning. However, post-tests showed that Group A learned more than Group B (Stull and Mayer, 2007). It’s possible that individuals in Group B did not complete the map correctly. Alternatively, perhaps the mental activity needed to complete the concept map absorbed cognitive resources needed for learning. A similar experiment by Leopold et al. (2013) evaluated
learning of a science text between learners who developed their own summaries with those who studied prepared summaries. The most effective learning occurred among those who studied the predefined summaries. The authors suggest that learners who engaged in behavioral processing may not have engaged in psychological processes. In contrast, those studying a predefined summary had more resources to invest in deeper psychological processing. We will look more closely at engagement in learning in chapter 4. For now I offer the following guideline.

Fads & Fables Guideline 5:
Behavioral activity during instruction does not necessarily lead to learning. It is psychological engagement that is most important.

TRAINING MYTH 6: GAMES, STORIES, AND SIMULATIONS PROMOTE LEARNING

Attend any training conference, look at the latest training books, or check out your favorite social media site. Chances are you will find real estate devoted to mobile learning, games, simulations, social media, or whatever is the technology or instructional method du jour. Training lore is full of claims and recommendations about the latest training methods like these. What’s wrong with these kinds of recommendations?

First, we are using such broad terms for our techniques that statements about them are meaningless. Take games for instance. Do you mean puzzle games, adventure games, strategy games, or simulation games? Do you mean individual paper and pencil games, video games, or group participation games? As a category, games include so much diversity that it is nearly impossible to make any generalizations about their instructional effectiveness. I’ll have more to say about games in chapter 14. (If you are especially
interested in games feel free to jump to chapter 14 now.) The same critique applies to many other instructional techniques such as graphics or stories.

**No Yellow Brick Road Effect**

Second, even if we narrow down to a fairly specific set of criteria for any given instructional method, its effectiveness will depend on the intended learning outcome and the learners. Is your goal to build awareness, to help learners memorize content, to teach procedural skills, to motivate, or to promote critical thinking?

And what about your learners? Regarding learner differences, prior knowledge (not learning styles!) is the most important factor that moderates the effects of instructional methods. Techniques that help novice learners are not necessarily going to apply to a learner with more expertise.

The lack of universal effectiveness of most instructional techniques is the basis for what I call the No Yellow Brick Road Effect. By that I mean that there are few best practices that will work for all learners and for all learning goals. The evidence that has accumulated during years of research on general categories such as graphics and games is the basis for my sixth recommendation.

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**Fads & Fables Guideline 6:**

Be skeptical about claims for the universal effectiveness of any instructional technique. Always ask: How is the technique defined? For whom is it useful? For what kinds of learning outcomes does it work?

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As evidence accumulates, I anticipate the guidelines I offer will be refined and perhaps in some cases even superseded. However, the research efforts of the last 25 years provide a foundation for a science of instruction—one that can offer practitioners a basis for minimizing resources wasted on the myths in favor of practices proven to enhance learning.
THE BOTTOM LINE

Let’s conclude by revisiting the responses you gave at the start of the chapter.

A. To accommodate different learning styles, it’s best to explain a visual with words presented in text and in audio.
   
   *FALSE*. The benefit of using text and audio to describe visuals is a common misconception among trainers. In chapter 6, we will examine the evidence and psychology of how to best use words to describe visuals.

B. Instructor-led classroom training results in better learning than computer-delivered instruction.
   
   *FALSE*. Evidence from hundreds of media comparison studies shows that learning effectiveness does not depend on the delivery medium but rather reflects the best use of basic instructional methods. Because not all media deliver all methods, evidence suggests that blended learning environments are more effective than pure classroom or pure digital learning. We will be reviewing evidence-based best practices for instructional modes and methods in the chapters to follow.

C. Courses that get higher student ratings generally produce better learning outcomes.
   
   *TRUE*, but only marginally. There is a very small positive relationship between ratings and learning. However, it is too small to draw any conclusions about the learning value of a class from student ratings of that class.
D. Learners make accurate decisions about their instructional needs. 
*FALSE*. Many learners are poor calibrators of their knowledge and skills; in instructional environments designed with learner control they may not make optimal learning decisions. An exception is pacing control, which should be provided in all e-courses.

E. Active engagement is essential to learning. 
*TRUE*, but . . . What’s important is psychological engagement that builds job-relevant knowledge and skills. Behavioral engagement can sometimes defeat appropriate psychological engagement and psychological engagement can occur in the absence of behavioral engagement, such as learning while reading or studying an example. See chapter 4 for more details.

F. Games are effective instructional methods. 
*FALSE*. The effectiveness of any instructional strategy, such as a game, will depend on features of the game, the intended learning outcome, and the prior knowledge of the learners. See chapter 14 for more on games.

**APPLYING EVIDENCE-BASED PRACTICE TO YOUR TRAINING**

The evidence I will review in this book can guide your decisions regarding the best instructional methods to use in your training. But more importantly, I will consider the book a success if you become a more critical consumer of the various training recommendations appearing in practitioner articles, social media sites, and conferences. My hope is next time you hear or read some generalizations about the latest technology or hot training method you will ask:

- What exactly are the features of this method?
- What is the evidence that supports this method?
- How valid is that evidence?
• For whom is the method most appropriate?
• How does the method fit with our understanding of the limits and strengths of human memory?

COMING NEXT

To move beyond training myths, I recommend taking an evidence-based approach. What is an evidence-based approach? What kind of evidence should you factor into your training decisions? What are the limits of research data? I turn to these questions in the next chapter.

FOR MORE INFORMATION


This handbook includes many chapters written by researchers that are relevant to workforce learning professionals.


This is a technical report of research on the relationship between prior domain knowledge and self-regulation during learning with multimedia media. You may not be interested in the details of the study, but the literature review at the beginning and discussion at the end are very interesting.


A comprehensive and readable review of research on learning styles.


A very readable update on media comparison research. Available free of charge online.