

E-Learning by Design

By

William Horton

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About this book

Why is this topic important?

The education required over a lifetime cannot be delivered by conventional means. People must learn more efficiently and at the time and place of their choosing. E-learning can deliver that education—but only if it is designed to do so.

Over the past decade, e-learning has moved from an experimental procedure used to teach technical subjects within computer companies to a mainstream staple teaching everything from life-saving medical procedures to spiritual vision. If you are concerned with educating others, you cannot ignore e-learning.

There are lots of books on instructional design and lots on how to operate particular tools to create e-learning, but few on how to apply instructional design to e-learning. This is that book.

What can the reader achieve with this book?

This book provides instructional designers, teachers, faculty, information technologists, subject-matter experts, individual consultants, and others tasked with moving to e-learning a clear path to the goal of effective e-learning.

The pragmatic and practical advice in this book is not limited to any particular tool or system. Most of the techniques here can be implemented with simple tools you already know how to operate.

You can acquire a rapid, yet systematic, design process that covers the hundreds of decisions necessary to create great e-learning.

How is this book organized?

The twelve chapters of this book lead the reader systematically through the decisions necessary to design effective e-learning. It starts with an overview of the design process for e-learning. Then it builds up from small pieces to course-wide issues. There are three chapters on how to use technology to create the learning experiences that really teach. Covered are learning games and simulations, guided tours, virtual labs, storytelling, guided research, and many other kinds of practice and discovery activities. Next follow instructions on how to create tests and other assessments that verify and measure learning progress. The next two chapters tell how to integrate activities and tests into learning objects that completely accomplish learning objectives and how to combine topics and activities into lessons that accomplish more ambitious goals. The next chapter covers strategic issues, such as whether to include real-time meetings or an instructor and what standards to follow. The book ends with chapters on how to design and teach instructor-led e-learning in the virtual classroom, how to design the visual display and navigation scheme within the course.

Where did this book come from?

E-Learning by Design is the logical successor to *Designing Web-Based Training*. This book is more than a second edition, but not an entirely new work. It evolves the ideas started there.

This book, as its title implies, is squarely about design. It is not about development tools or other technologies. Design of e-learning involves instructional design, but goes beyond instructional design to include aspects of media design, software engineering, and economics. The goal is to tell readers how to design e-learning that works as well as the best classroom learning.

This book contains my best advice from my experience creating online learning. Since 1971, I have designed, built, researched, and evaluated what we now call e-learning. I have worked in electronic media most of my career from perspectives of design, management, and technology,

How can you get the most out of this book?

Read actively. Skim, scan, skip. Look at the pictures. Find something that interests you and read it in detail.

Where did the examples come from?

All examples were designed by William and Katherine Horton of William Horton Consulting. Unless otherwise

noted, all examples were also built by William or Katherine Horton. Many of them are on exhibit at horton.com/eld/. We want to thank The Alban Institute and Indianapolis Center for Congregations, Brightline Compliance, The Gantt Group, Jones International University, The Office of Surface Mining and Reclamation, the Veterans Administration Office of Research and Development, and Web Courseworks for having us design them and letting us show them.

Where is the CD?

This book has an extensive Web presence with dozens of complete examples and supplementary materials. Check it out at: horton.com/eld

Who created this book?

William Horton wrote, typed, and indexed it. Katherine Horton designed the layout and formatted the book. William and Katherine drew the graphics. Rebecca Taft contributed proofreading. William and Katherine Horton suggested the cover design. And Pfeiffer took it from there.

About Pfeiffer

Pfeiffer serves the professional development and hands-on resource needs of training and human resource practitioners and gives them products to do their jobs better. We deliver proven ideas and solutions from experts in HR development and HR management, and we offer effective and customizable tools to improve workplace performance. From novice to seasoned professional, Pfeiffer is the source you can trust to make yourself and your organization more successful.



Essential Knowledge Pfeiffer produces insightful, practical, and comprehensive materials on topics that matter the most to training and HR professionals. Our Essential Knowledge resources translate the expertise of seasoned professionals into practical, how-to guidance on critical workplace issues and problems. These resources are supported by case studies, worksheets, and job aids and are frequently supplemented with CD-ROMs, websites, and other means of making the content easier to read, understand, and use.



Essential Tools Pfeiffer's Essential Tools resources save time and expense by offering proven, ready-to-use materials—including exercises, activities, games, instruments, and assessments—for use during a training or team-learning event. These resources are frequently offered in looseleaf or CD-ROM format to facilitate copying and customization of the material.

Pfeiffer also recognizes the remarkable power of new technologies in expanding the reach and effectiveness of training. While e-hype has often created whizbang solutions in search of a problem, we are dedicated to bringing convenience and enhancements to proven training solutions. All our e-tools comply with rigorous functionality standards. The most appropriate technology wrapped around essential content yields the perfect solution for today's on-the-go trainers and human resource professionals.



Essential resources for training and HR professionals

1

Designing e-learning

Planning the development of online learning

For tens of thousands of years, human beings have come together to learn and share knowledge. Until now, we have had to come together at the same time and place. But today, the technologies of the Internet have eliminated that requirement. Soon anybody will be able to learn anything anywhere at any time, thanks to a new development called e-learning.

WHAT IS E-LEARNING?

E-learning marshals computer and network technologies to the task of education. Several definitions of e-learning are common. Some people hold that e-learning is limited to what takes place entirely within a Web browser without the need for other software or learning resources. Such a pure definition, though, leaves out many of the truly effective uses of related technologies for learning.

Definition of e-learning

There are a lot of complex definitions of e-learning, so I'll offer you a simple one:

E-learning is the use of information and computer technologies to create learning experiences.

This definition is deliberately open-ended, allowing complete freedom as to how these experiences are formulated, organized, and created. Notice that this definition does not mention “courses,” for courses are just one way to package e-learning experiences. It also does not mention any particular authoring tool or management system.

Varieties of e-learning

E-learning comes in many forms. You may have taken one or two forms of e-learning, but have you considered them all?

- **Standalone courses.** Courses taken by a solo learner. Self-paced without interaction with an instructor or classmates. There are numerous examples of standalone courses cited in this book. Search the index for *Using Gantt Charts*, *GALENA Slope Stability Analysis*, and *Vision and the Church*. You can also go to the Web site for this book (horton.com/eld/) to find links to live examples.
- **Virtual-classroom courses.** Online class structured much like a classroom course. May or may not include synchronous online meetings. Just such a course is described starting on page 336. Also read Chapter 9, starting on page 415.
- **Learning games and simulations.** Learning by performing simulated activities that require exploration and lead to discoveries. Read more about games and simulations starting on page 141. Also go to horton.com/eld/ for links to live examples.

- **Embedded e-learning.** E-learning included in another system, such as a computer program, a diagnostic procedure, or online Help. Learn more about embedded e-learning starting on page 387. Also, view an example at horton.com/eld/.
- **Blended learning.** Use of various forms of learning to accomplish a single goal. May mix classroom and e-learning or various forms of e-learning. Start reading on page 381.
- **Mobile learning.** Learning from the world while moving about in the world. Aided by mobile devices such as PDAs and smart phones. Mobile learning examples are shown in Chapters 2, 4, 5, and 10.
- **Knowledge management.** Broad uses of e-learning, online documents, and conventional media to educate entire populations and organizations rather than just individuals. To learn more about practical knowledge management, go to horton.com/html/whckmt.asp.

And that is just the start. As you read this, clever designers are creating even more forms of e-learning.

WHAT IS E-LEARNING DESIGN?

At its best, e-learning is as good as the best classroom learning. And at its worst, it is as bad as the worst classroom learning. The difference is design.

Creating effective e-learning requires both design and development. Design is not the same as development. Design is decision. Development is doing. Design governs *what* we do; development governs *how* we carry out those decisions. Design involves judgment, compromise, tradeoff,

and creativity. Design is the 1001 decisions, big and small, that affect the outcome. This book is about design.

Start with good instructional design

Instructional design requires selecting, organizing, and specifying the learning experiences necessary to teach somebody something. Good instructional design is independent of the technology or personnel used to create those learning experiences.

What is instructional design?

In this chapter I use the term *instructional design* in its broad meaning, which includes pedagogy and androgogy, although my usage is closer to the strict meaning of androgogy (teaching adults) than the limited definition of instructional design popular in some quarters. By instructional design, I definitely do not mean the heavy-handed, Stalinesque distortion of theory required to accompany many ponderous instructional systems design (ISD) methodologies.

Instructional design is a vast subject. This humble chapter cannot cover it all. Here you will find a streamlined, rapid instructional-design method. The process taught here is simple, quick, informal, and pragmatic. Use it as your survival kit when you do not have time or money for more. Or use it as a check on your longer, more formal process.

Before you fast-forward to another chapter with more screen snapshots and fewer diagrams, take a moment to decide

whether this chapter might have something to offer you.

Instructional design determines everything else

Instructional design translates the high-level project goals to choices for technology, content, and everything else. The instructional design of e-learning informs decisions on what authoring tools, management systems, and other technologies to buy or license. Instructional design directs the development of content and the selection of media. It orchestrates decisions on budget, schedule, and other aspects of project development. So, design your instruction—at least on paper—before buying any technology or recruiting new staff members.

Please do not skip this chapter

True, not everybody needs to learn about instructional design. To decide whether you need this chapter, ask yourself these questions?

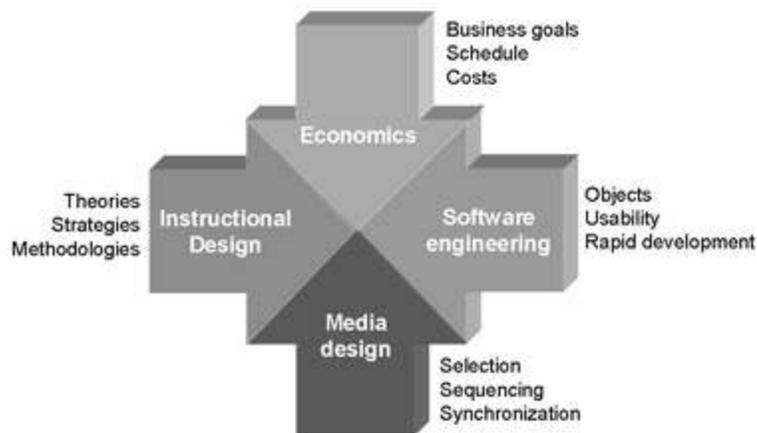
- Has your instructional design education and experience been primarily for the classroom?
- Is your current instructional design methodology too slow and cumbersome to meet your deadlines? Do you need something more rapid and agile?
- Do you like to see an overview of where you are going before you depart on a difficult journey?
- Do you lack either education and experience in instructional design? Perhaps you are a subject-matter expert or instructor who has inherited the responsibility for designing e-learning. Or a manager

who needs to evaluate the portfolios of instructional designers you might hire.

If the answer to any of these questions is yes, read on.

Consider multiple perspectives

In e-learning, the responsibility to provoke effective learning experiences may be divided. Successful e-learning design is the result of four main influences, each contributing concerns and capabilities. Producing effective e-learning is a large job requiring several different skills: instructional design, media design, software engineering, and economics.



Each of these influences contributes concepts, procedures, and techniques:

- **Instructional design** contributes theories about how human beings learn, strategies for applying these theories, and methodologies to carry out the strategies. The knowledge of how human beings learn can guide selection and specification of new kinds of learning experiences such as simulations, learning games, online meetings, and discussion forums.

- **Software engineering** helps us build reliable computer programs. Like it or not, e-learning is software. It runs on a computer, just as a spreadsheet or word processor does. It has a user-interface and may draw content from a distant database. It transmits media over networks. It thus requires the same careful design and quality control as other forms of software. Software engineering contributes the concepts of object design, usability design, and rapid prototyping.
- **Media design** helps us use digital media well. When the only media were the words on a chalkboard and the instructor's voice, we did not need to "design" media. Today we must select the appropriate mixture of text, graphics, voice, music, sound effects, animation, and video. We must then sequence these various media and synchronize complementary media.
- **Economics** helps e-learning deliver value. E-learning costs money. It may generate revenue. It takes time, people, and other resources to create, offer, and maintain. It must be developed under a budget and on schedule.

In my experience, one of the most common mistakes is equating e-learning design with instructional design. I have worked with instructional designers who refused to consider any of the other factors. They produced designs that were never produced because they could not be realized with available technologies or cost too much.

The day when one person can comfortably perform all these necessary activities is still a way off. Until then, the joint role of e-learning designer must encompass several disciplines. Why? These disciplines are performed by different

specialists and teams, especially in complex projects. The goals of one discipline may conflict with those of another. Business goals may call for a sedate, conservative appearance, while the media designer wants to showcase video and animation.

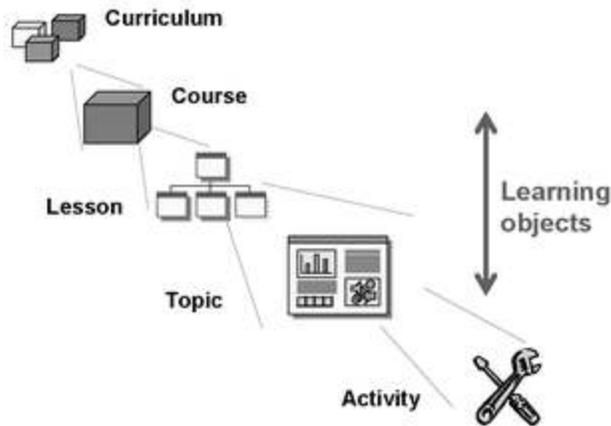
Many people trained in one discipline lack experience in the others. Instructional designers educated over ten years ago may know little about how to select dynamic electronic media. Even recent grads lack extensive training in animation design or game theory.

Some aspects of e-learning production may be outsourced, along with the detail design for that area. On one recent project, a training company outsourced the instructional design to me, had the software engineering done by their in-house information technology department, and outsourced the production of media to a firm in another country.

True designers—and project leaders—will balance all these concerns and be knowledgeable enough to resolve conflicts, make compromises, and spark innovation.

Design all units of e-learning

Design must be applied at all levels of e-learning from whole curricula down to individual media components. It is important to understand these units because they influence what design techniques we use.



At the top of the pyramid are *curricula*, such as academic programs that include related courses that lead to a degree or certificate in a subject area. A curriculum could also refer to a library of courses on a certain subject.

Curricula are typically composed of *courses*, each of which teaches a broad but specific area of a subject. We might also call such units *books* or *knowledge products*. Course-level design issues are discussed in Chapter 8.

Courses are composed of clusters of smaller components called *lessons*. Each lesson is organized to accomplish one of the broad objectives of the course or a cluster of related objectives. Chapter 7 will help you design lessons.

At a lower level are the individual *topics*, each designed to accomplish a single low-level learning objective. For help designing topics, turn to Chapter 6.

At the bottom level are *learning activities*, each designed to provoke a specific learning experience. Each activity may

answer a specific question or make a point, but they are seldom sufficient to accomplish a learning objective by themselves. Activities are the subject of Chapters 2 through 4. Activities used to measure learning are called tests. They are the subject of Chapter 5.

The middle three units (course, lesson, and topic) may all be designed as self-contained *learning objects*.

Let's see how to apply these levels in the real world. Here is a slice down through a single subject area:

Curriculum: Master's of Business Administration program.

Course: "Accounting 101."

Lesson: "Assets and Liabilities."

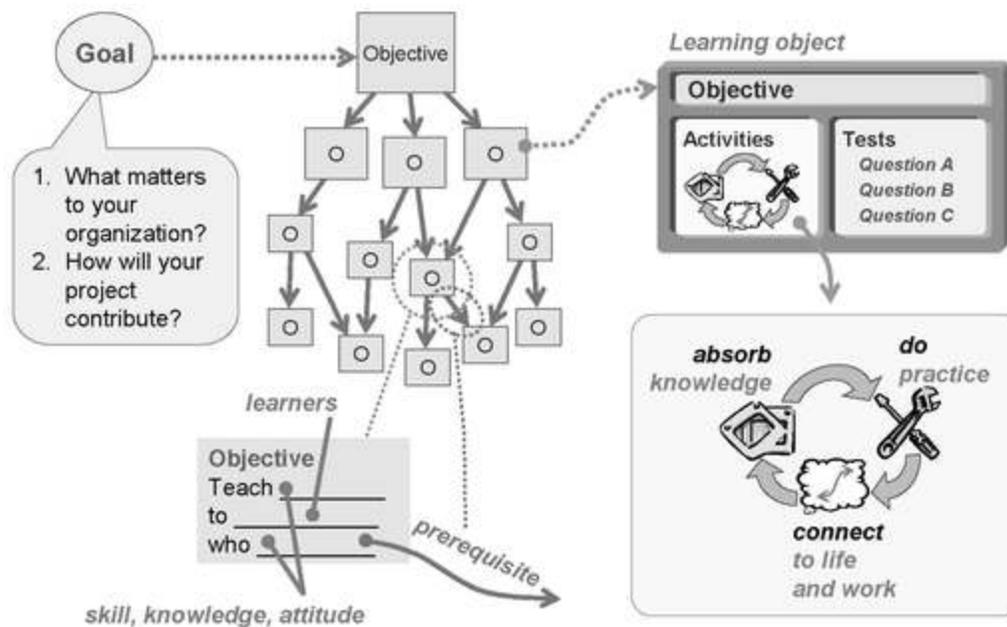
Topic: "Evaluating assets."

Activity: Using a spreadsheet to calculate the values of assets.

DESIGN QUICKLY AND RELIABLY

E-learning benefits most from a rapid, cyclical design process. In this section you will find a minimalist, waste-no-time, results-focused approach to specifying e-learning that actually works. This process omits unnecessary steps and concentrates on the design tasks that really matter.

In the interest of speedy learning, we'll start with a preview, overview, summary, and job aid all rolled into one. Print it out, enlarge it, and pin it to your wall, where you can refer to it throughout your projects. An Adobe PDF version is available at horton.com/eld/.



The first step in quick instructional design is to clarify the goal of your project. This is a simple two-step procedure. First you nail down what matters to your organization—the one sponsoring development of learning. Is it profit or public service? Return on investment or reputation?

Next you describe how your project will contribute directly to that organizational goal. If you draw a blank at this point, cancel the project now before wasting resources. Once you do define how your project contributes, you have a solid basis to ask for funding and other support.

The next step is to write the learning objective for the course. This objective states how the learner is changed by the course. It describes the end result of taking the course. That objective, however, may have prerequisite objectives. And those second-level objectives may have prerequisites as well. You keep identifying prerequisite objectives until you reach the starting abilities of intended learners.

I use a simple formula to state objectives: Teach *blank* to *blank* who *blank*. That is, teach a *subject* to a *group of people* who *know certain things* already. The first slot records what we intend to teach. It is usually a skill, some knowledge, or an attitude. The second slot records who will learn the subject. It describes a group of learners. The third slot records what aspects of the subject the learners know or can do. Like the first slot, it records a skill, knowledge, or attitude. This last slot represents a prerequisite for the objective. It may point to another objective to satisfy that prerequisite.

Each learning objective requires us to design a learning object to accomplish that objective. Our instructional design of the object requires us to design two types of content: learning activities and tests.

Learners complete learning activities in order to learn. There are usually three types of learning activities required: the learner *absorbs* knowledge by reading or watching; the learner *does* practice or discovery activities to deepen learning; and learners complete activities designed to *connect* what they are learning to their lives and work.

Tests are questions or other assessments to verify that learning occurred and the objective was accomplished.

Don't worry if this process is not crystal clear. I will explain each of these steps in more detail.

Identify your underlying goal

Design starts with a goal. You may be designing an office building or a monumental sculpture. You may be designing a rocket or an automobile. You may be designing e-learning. Before you can design any of these things, you must know what it is your design must accomplish.

Rather than start listing the things you will accomplish for learners, however, think about what you will do for your employer, your sponsor, or your financial backers. What does your organization hope to accomplish? Your list might look something like this:

- Reduce costs of education by 50% over the next year.
- Quickly prepare a global marketing plan to sell a new line of products.
- Cut misdiagnoses of battery failures by 90%.
- Earn \$200,000 by selling courses.
- Recertify 150 nuclear power plant operators.

Keep the organizational goal in mind as you make other decisions. Write this goal on a note card and tack it to your wall. Every day, ask yourself: "How am I helping achieve that goal?"

Ask what matters

Your overall goal tells you what really matters. To clarify your goal, you need to answer two questions.

The first question is “What matters to your organization?” We might phrase the question this way: “For your company, university, department, government, or institution, what is the single most important measure of success?” Try to answer in three words or fewer. That restriction focuses your goal. Three words are plenty. You might say “bottom-line profit” or “return on investment.” Or you might say “public service” or “unblemished reputation.” On one of our projects, the Gantt Group, a consulting firm specializing in teaching project management, identified their goal as:

For your organization, what is the single most important measure of success? [3 words maximum]

More clients

They figured if they attracted enough clients, revenues and profits would follow.

The second question asks how your project will help accomplish that goal. How will the e-learning you design contribute to that goal? I am not saying your e-learning will accomplish the goal by itself, but you certainly should be able to state how it will contribute. If you cannot