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 andrologogy, although my usage is closer to the strict meaning of andrologogy (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

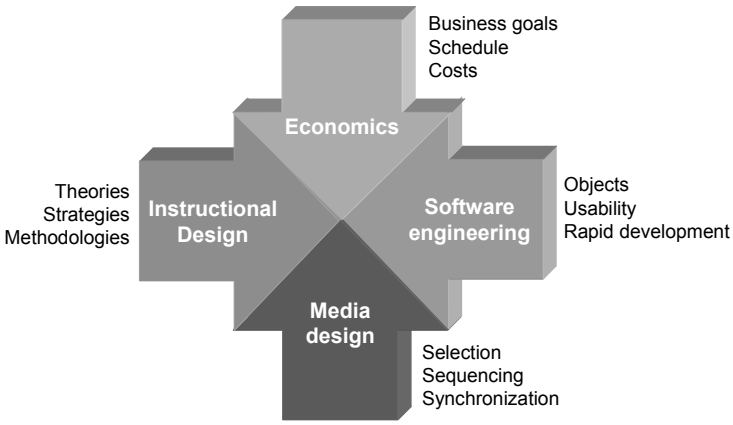
True, not everybody needs to learn about instructional design. To decide whether you need this chapter, ask yourself these questions?

- 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.

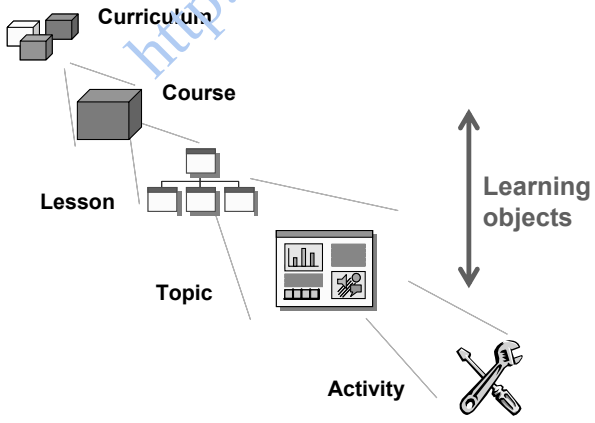
Many people trained in one discipline lack experience in the others. Instructional designers educated over ten years ago may know little about how to select dynamic electronic media. Even recent grads lack extensive training in animation design or game theory.

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 though 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."

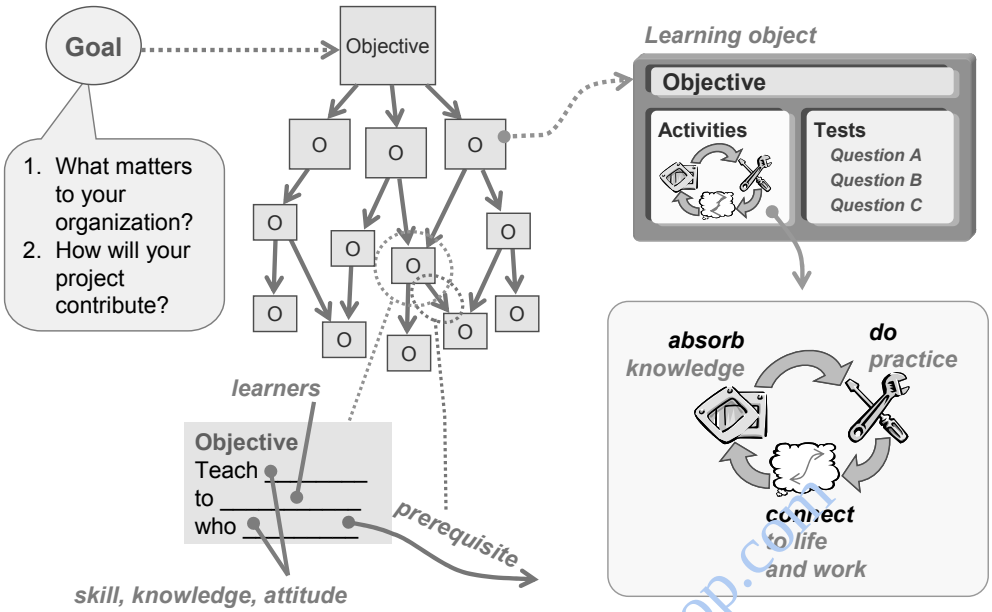
Topic: "Evaluating assets."

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 convincingly and honestly argue that your project contributes to the goal, consider canceling the project now. Without such alignment with organizational goals, your project may run out of money, time, and management support. Better to stop now before antagonizing the management of your organization by wasting organizational resources on an endeavor that does not matter to the organization.

Let's look at how this question was answered for the Gantt Group:

How will your project help accomplish that goal?

Convince potential clients that understanding Gantt charts can make them more successful project managers (and that the Gantt Group is the source for that understanding).

The proposed project was aimed at garnering more clients by convincing potential clients that understanding Gantt charts, which are a common tool of project management, could

make them more successful and that the Gantt Group was the source for that understanding.

Make your organization's goal your goal

Create a bridge connecting a high-priority goal of your organization and the learning objectives of your e-learning so both business managers and instructional designers see the value of e-learning to the organization. Notice how this statement provides just such a bridge:

> Most misdiagnoses of battery problems are caused by lack of knowledge among customer-support technicians about the modes of battery failure and the symptoms they can produce. By training customer-support technicians, we can reduce the rate of misdiagnosis by at least 90%.

About half of the designers I have worked with stubbornly refuse to consider the underlying organizational goal when designing instruction. They do not feel that organizational goals are their responsibility. They design courses that accomplish little—or that die for lack of organizational support. This is tragic because it only takes two questions to align learning objectives to organizational goals.

Consider a wide range of goals

Organizational goals are not limited to profit or return-on-investment. Peruse your organization's annual report or replay speeches by your organization's leaders. Observe what your leaders emphasize as the values and goal of the organization.

Type goal	Description	Measures
Financial	Monetary success of a for-profit or not-for-profit enterprise.	▶ Profit. ▶ Cash flow. ▶ Margin. ▶ Stock price. ▶ Venture capital.
Intellectual capital	Knowledge the organization controls.	▶ Education level of staff. ▶ Professional experience of staff. ▶ Rates of attracting and retaining talent. ▶ Patents and inventions.

Type goal	Description	Measures
Customers	Consumers of the organization's services or products.	▶ Students. ▶ Accounts, clients, sponsors. ▶ Market share.
Operations	Efficiency and speed with which the organization performs its mission.	▶ Time to market. ▶ Cost per unit.
Reputation	Public image of an organization.	▶ Industry awards. ▶ Rankings and ratings. ▶ Community-service awards.

Set learning objectives

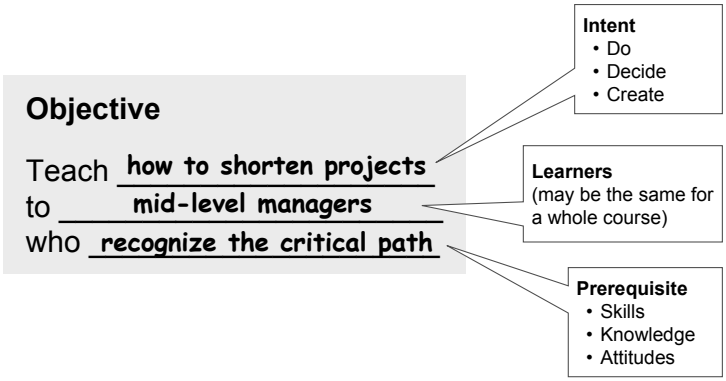
Good objectives are a mission-critical, sin qua non, must-have, make-or-break requirement for effective e-learning. Forgive me for stacking up so many adjectives, but without exception clear objectives make everything go better. In my experience, well over half the failures of e-learning projects would have been prevented by clear objectives.

Everything stems from the objectives. From the objectives, we identify prerequisites, select learning activities, and design tests. Good objectives focus efforts, reduce false starts, and cut waste enormously.

Write your learning objectives

Once you have clarified the goal of your project, you can write the primary learning objective for your course. This objective states what the course will accomplish.

There are many opinions on how to write objectives and complete methodologies on just how to phrase objectives. Search amazon.com for books by Robert Mager or Robert Gagné and you will find some examples. For quick instructional design, however, I use a single, simple formula that works well almost all the time. It states learning objectives in three parts. First, the objective states the intent, that is, what will be taught. Second, it identifies the target learner. Third, it identifies starting requirements.



For the example of the course *Using Gantt Charts*, the top-level objective of the course was to teach how to shorten projects. It was to teach this subject to mid-level managers. But those managers had to know how to recognize the critical path in a Gantt chart.

For our quick objective, the first slot records what we want to teach. Usually it is to do something, make a decision, or create something.

The second slot records the group of people we want to accomplish this objective. If an entire course is aimed at a single group of people, this slot may have the same answer for every objective in the course.

The final slot records the prerequisites necessary to make accomplishing the objective practical. Prerequisites are usually stated as the skills, knowledge, and attitudes learners must possess. The prerequisites slot can have multiple answers, but the teach slot has only a single skill, item of knowledge, or attitude.

What makes a good objective?

Good learning objectives are clear, precise, and worthy. Let's look at each of these requirements.

Clear

A learning objective should be clear to everyone involved with it. The objective must tell the project's management team what you intend to accomplish. It must give the media designer specific marching orders. And it must communicate the "what's in it for me" to the learner.

Precise

The learning objective must specify the required learning in enough detail that we can measure its accomplishment. You may be thinking that what we have listed as an objective is not complete or precise enough. Correct. Right now, it is more of a goal. But don't worry; we will tighten it up considerably.

My advice is don't get too precise too soon. Early in a project, it is more important to write down all your objectives briefly than to specify them in excruciating detail. Once you have all your learning "goals" spread out in front of you and have eliminated unnecessary ones, you can flesh them out one at a time.

Worthy

Your learning objective must directly contribute to accomplishing the underlying organizational goal. Responsible developers continually check their objectives against the organizational goal.

Types of objectives

Some complex methodologies for writing objectives list hundreds of different types of objectives. I list six types of objectives—three primary and three secondary. Applied with sensitivity and common sense, they suffice 95% of the time.

Instructional intent can be expressed in the following format. This format consists of a standard preamble and one of six possible completions.

By experiencing this lesson or topic, the learner will be able to:

Primary objectives	Secondary objectives
▶ **Do** procedure X to accomplish Y.	▶ **Believe** X.
▶ **Create** or design an X that does Y.	▶ **Feel** X about Y.
▶ **Decide** X, given Y.	▶ **Know** X about Y.

Primary and secondary objectives

Objectives can be primary or secondary. Primary objectives are the ultimate reasons for learning while secondary objectives enable accomplishment of the primary objective, even though they are seldom the targeted result.

Both are important, but the primary objectives are the ones you must teach to accomplish your overall objective. Primary objectives are *performance* objectives in that they prescribe things people will be able to do as a result of your e-learning. As such they are sometimes

called *terminal* objectives. But they can also be *enabling* objectives, that is, things you teach so that learners can learn the terminal objectives. Secondary objectives are always enabling objectives. They are not the main goal, but may be essential nonetheless to accomplish the primary objectives.

So, if you write the overall objective for your e-learning and it looks like one of the secondary objectives here, reconsider. Ask yourself, why do you want someone to believe, feel, or know something? What will meeting such an objective accomplish? The answer to these questions pinpoints your primary objective.

I have not made a big deal about separating cognitive, affective, and psychomotor objectives. Most real-world tasks involve components of all three. For example to perform CPR, you must know the steps of the procedure (cognitive), know how the procedure varies for infants (cognitive), have courage (affective), remain calm (affective), perform coordinated movements (psychomotor), and adjust the procedure based on sounds and tactile sensations (psychomotor).

Primary objectives state your goals

Primary objectives are the goals your e-learning should accomplish. Primary objectives are stated in terms of performance, that is, what the learner will be able to do.

The following table lists the various forms of primary instructional objectives and provides examples of statements of each form.

Type objective	When situation Z occurs, the learner will …	Examples
Do	Do X to accomplish Y.	…once a month, complete the cleanup procedure to remove invalid e-mail addresses from the mailing list. … mix base and tint colors to match a sample provided by the buyer. … use the Explorer view to set up the file structure for a complex Web site. … lift heavy packages by flexing the knees rather than bending the back. … apply principles learned in Calculus 101 to problems encountered in Calculus 201.

Type objective	When situation Z occurs, the learner will …	Examples
Decide	Decide Y.	… pick a course of treatment based on a physical examination of the patient and standard blood tests. … select which looping construct is most efficient for each type of iterative procedure. … decide a strategy for dealing with a difficult co-worker based on the past behavior of the co-worker. … order a salad rather than a double cheeseburger. … pick team members based on what they can contribute rather than on familiarity, friendship, or superficial characteristics. … use leveraged investments moderately in a rational fashion rather than as a form of gambling.
Create	Design or build an X that does Y.	… plan the development effort for complex XML projects. … specify the layout of a city park that meets environmental, aesthetic, and logistical requirements. … write a program to export information from a common database to an XML format containing just the information specified. … build a 1/24 scale model of the proposed dwelling.

You may be accustomed to writing objectives in terms of skills, knowledge, and attitudes. If so, just remember that skills typically require *do* or *create* objectives. Attitudes use *decide* objectives to ask whether the learner consistently makes choices indicated by the attitude.

Do not fret if your objectives are not 100% clear at this point. You will further clarify your objectives when you design tests to measure accomplishment of the objective.

Secondary objectives help accomplish goals

Secondary objectives teach something necessary to accomplish a primary objective. They state what the learner will know, believe, or feel.

Type objective	When situation Z occurs, the learner will …	Examples
Know	Know X about Y.	… be able to recall the country codes for 99% of our international shipments. … know calming words to use during disputes. … identify all bones in the human hand by name.
Believe	Believe X.	… believe that our company is the most reliable supplier in our market. … believe that they can accomplish their financial objectives by working with us. … deem mutual funds worthy of a place in their portfolios.
Feel	Feel X about Y.	… feel positively about our company's entire product line. … remain calm when confronted by an angry stranger. … have confidence that they can use our products to solve their own problems. … feel sympathy (rather than pity) for co-workers with disabilities.

Spell out the situation

We teach so that learners can apply what they learn, not merely accumulate knowledge. People apply knowledge, skills, and attitudes in real-world situations. As part of the objective, we need to specify what those situations are. That way, designers can tailor the

design to accomplishing results in these situations. *Situation* is a pretty broad term. It can include three main factors: events that trigger application of learning, conditions under which the learner must act, and resources the learner will need in order to apply learning.

Trigger

What events will trigger application of the learning? What must the learner recognize as a cue to act? Will the learner receive explicit prompts to apply learning? Or will the learner need to infer the need for action from subtle cues in the environment? Is this an action that is applied periodically to a schedule?

Conditions

Under what conditions does the learner perform the action? In what environment does the learner act? Where does the action take place? How noisy is the environment? Is it especially hot or cold? How much room does the learner have? Is lighting adequate? Is the learner subject to frequent interruptions?

Resources

What resources can the learner draw on? Books? Calculators? Access to the Web? Memory only? What assistance will the learner have? A supervisor to guide the learner? Peers with whom to discuss problems?

Set criteria for success

What degree of success will learners accomplish? We like to think that all learners will be perfectly successful in accomplishing the intended results. Ironically, though, designing for a goal of perfect performance often leads to worse, not better, results. Thus, for each objective, we should state realistically how successful learners should be in applying what they learn.

Quantifying the degree of success is not easy, but we can at least set metrics such as these:

- Percent of learners who will accomplish the objective perfectly.
- Average error rate.
- Time required to perform the task.
- Results produced in a specified period of time.
- Reduction in frequency of problems or increase in rate of favorable incidents.

Examples of complete learning objectives

Here are some examples of learning objectives from different courses:

Learners	Situation	Action	Criteria
Full-time foresters with fewer than five years' experience.	When asked to recommend a policy. They will have access to Web-based resources.	Objectively consider controlled burns as a means of forest management.	Novice foresters will recommend controlled burning with the same frequency as more experienced foresters.
Visual Basic programmers working on database projects.	When the need arises. Access to all online documentation and other Web-based resources.	Write routines to retrieve, alter, and rewrite data using ADO and RDS.	Within 10 minutes, at least 85% will be able to write the routines.
Customer support technicians.	When answering customer complaints over the phone. Using a diagnostic procedure recalled from memory.	Correctly identify the cause of battery failures.	Reduce the current rate of misdiagnosis by 90%.
Individual investors.	Using Web-based resources during the course.	Develop a balanced financial plan to accomplish their individual objectives.	Over 90% will complete their plans.

Analyze learners' needs and abilities

Whose knowledge, skills, and attitudes are you trying to alter? Research the groups of potential learners until you can answer these questions:

- What are the learners' current levels of knowledge, biases, skills, and attitudes?
- What are their expectations and attitudes toward learning?

- What motivates them to learn?
- How well prepared are they to use e-learning technologies?

Such intimate knowledge may require conducting surveys, interviews, and testing. I use a form like this to summarize the characteristics of each group of learners who will take my e-learning:

Gantt chart readers — **Learners** —

ID

Project	Scope	Identification	Owner
Course: **Reading Gantt Charts**	Entire course	RGC-Consumers-01 Version 1.1 – (2003.5.1)	838 Spruce Street, Boulder, CO, 80203 +1.303.545.6964 william@horton.com

Learners

Description	Job function	Education	Experience	Demographics
Middle and upper managers who need to read and interpret Gantt charts. Typically supervise those who actually construct the Gantt charts. **Portion of total audience**: 100%	General management duties, including management of complex projects **Time value**: $100K per year	Business degree and training in corporate policies but no specific training in reading and constructing Gantt charts.	85% have seen Gantt charts, understand that they show project schedules, and perhaps recognize task bars.	**Age range** 30-65 **Gender mix** 60% male **Nationality** 65% US & Canada

Goals

What do they hope to gain?	Why do they take the learning?				Financial involvement
Learn to interpret Gantt charts, especially how to use them to make better decisions regarding the scheduling and supervision of complex projects	65%	To accomplish current job		To make more money	Paid for time learning? Yes
		Required by boss	15%	Curiosity & self-improvement	Costs they pay themselves: (none)
	20%	To qualify for new job		Other	
		To pass certification test			

Where

When will they learn?	Where will they learn?	Geographic distribution	Environment
Designated times	60% Private office	All in one building	Space: No room for more than one piece of paper beside the computer
85% Normal work hours	30% Cubicle	All on one campus	Lighting: OK
5% Evenings	Factory floor	All in one city	Noise: Normal office noise with frequent interruptions (every 10 minutes or so)
10% Weekends	Training center	60% All in one country	
Other	5% Hotel	40% over 24 time zones	
	15% Home		
	Other:		

Abilities

Computer skills		Language skills	Typing	Disabilities
X E-mail	Chat and messaging	Reading 10th Grade level	E-mail quality 15 words/min	None beyond those implied by the demographics of learners.
X Web browser	Install software	Writing 10th Grade level	Letter quality 10 words/min	Note: This course is not required to comply with Section 508 or W3C WAG
X Word processor	Writing macros	Languages		
X Other desktop applications	Programming	English 60% 1st language		
Discussion forums		40% 2nd language		

Technology

Hardware				Software		Network connection				
Processor	P2 100+ MHz	**Disc**	CD-ROM 4X	**OS**	Windows 98	**%**	**Type**	**Up**	**Down**	**Cost**
Memory	24 MB	**Audio out**	16-bit	**Browser**	IE 4+, NS 4+	60%	Intranet	1 M	1M	-
Display size	800 x 600	**Audio in**	(none)	**Players**	Flash 4	20%	Broadband	.2 M	1M	-
Colors	Thousands	**Video in**	(none)	**Applications**	MS Project	20%	Dialup	.02 M	.02 M	-
						-	Wireless			

An Adobe PDF version is available at horton.com/eld/.

Consider defined curricula

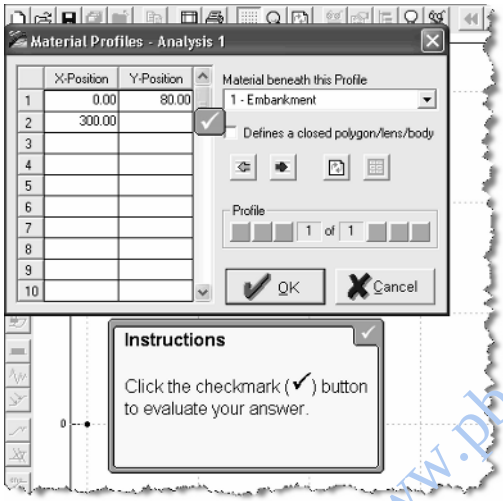
When setting objectives for a course or curricula, consider whether someone has already defined the required body of knowledge or skills to be taught. For the area of your course or curriculum, are requirements defined by:

- Government regulations?
- Certification or licensing procedures?
- Standard reference works?
- Professional associations?
- Standardized academic curricula?

Such definitions can save you months of research and debate in defining learning objectives of your project.

Teach essential skills

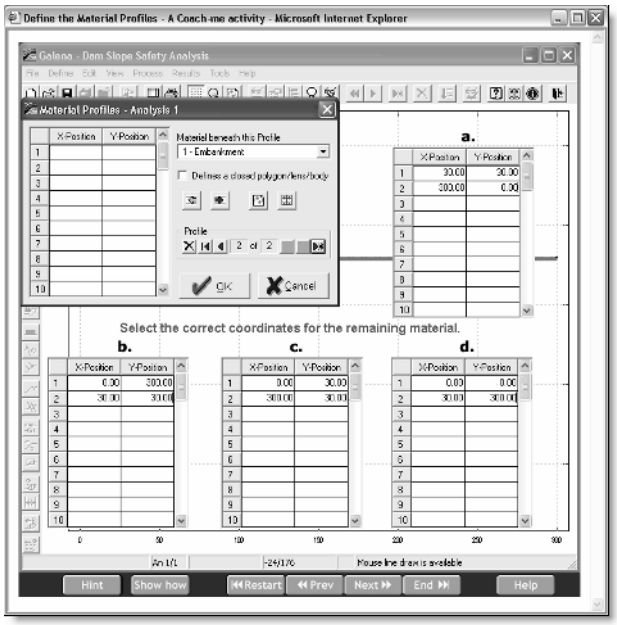
Instruction is only effective if it teaches the right things. One common problem occurs when we teach low-level, explicit knowledge that learners already know, could figure out on their own, or will never apply. For instance, many courses on computer operations teach typing rather than the skills really needed to use the computer successfully.



For example, this portion of a simulation requires learners to type numbers into the cells of a grid.

The problem with this approach is that it focuses attention on the task of typing in numbers. It encourages tunnel vision that distracts from the more important task of teaching what goes into the grid.

Typing skills are not the critical skill. The critical skill is entering the right pattern of data. This revision of the activity focuses attention on the relationships among values rather than merely typing numerals.



Created with Adobe Captivate.

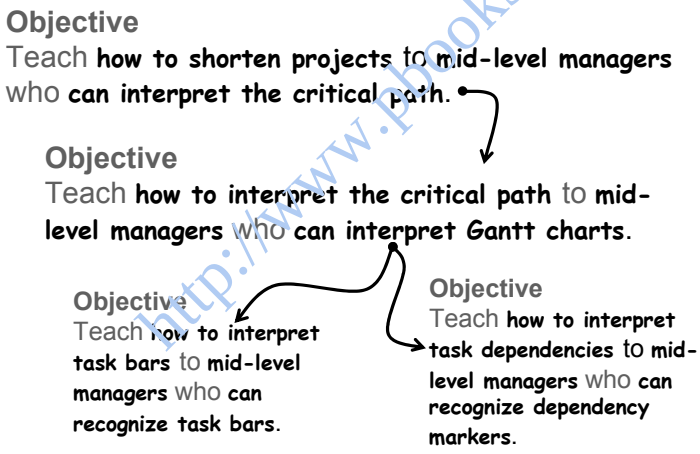
Identify prerequisites

No project of any complexity will have just a single, simple learning objective. Whatever the top-level learning objective, it has prerequisites that you must identify. Such prerequisites specify the skills and knowledge learners must possess before they can begin to accomplish the main objective.

Spot related objectives

Starting with the top objective, the design identifies a cascade of prerequisite objectives. As an example, let's look at the top objective for the course *Using Gantt Charts*. It is to teach how to shorten projects to mid-level managers who can interpret the critical path. Fine, but not all mid-level managers will already know how to interpret the critical path.

That means we need another lower-level objective to meet that prerequisite. This objective would require teaching how to interpret the critical path. It would be aimed at the same mid-level managers as before. This new objective has its own prerequisite, namely, the ability to interpret Gantt charts in general.



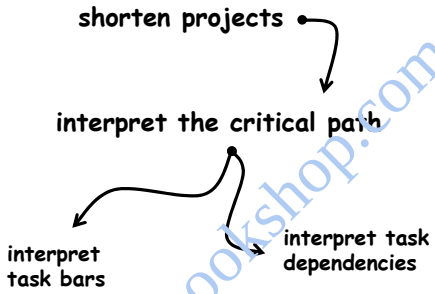
Interpreting Gantt charts in turn requires objectives on how to interpret task bars and how to interpret task dependencies. Both of these two new objectives are prerequisites of the prior objective.

Thus, objectives develop in a cascade downward from the top-level learning objective as we repeatedly ask what the learner must know before beginning an objective.

State objectives in shorthand

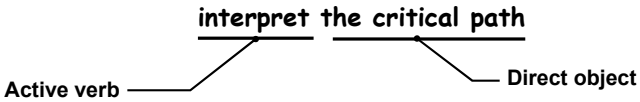
My formula for writing objectives is simple, but writing dozens of objectives can become tedious. Perhaps that is why many designers skip all that work and just begin developing content. Resist that urge. If you want to, you can streamline the process by writing objectives in a shorthand fashion.

To streamline the statement of an objective, state just what the learner will be able to do after accomplishing the objective. "Teach how to shorten projects to mid-level managers who can interpret the critical path" becomes just "shorten projects." Our next objective becomes just "interpret the critical path." And our final two objectives become just "interpret task bars" and "interpret task dependencies."



We can streamline the statement of objectives because the learners are typically similar throughout an entire course and because the prerequisite for a higher-level objective becomes the subject for the next objective down the cascade.

This shorthand works best when the objective is stated in the grammatical form that expresses it as a task the learner will be able to accomplish. The first part of this grammatical form is an active verb, such as "interpret" or "shorten." The second part is a phrase representing the direct object of the verb, that is, what the verb acts on. This format keeps the focus on performance.

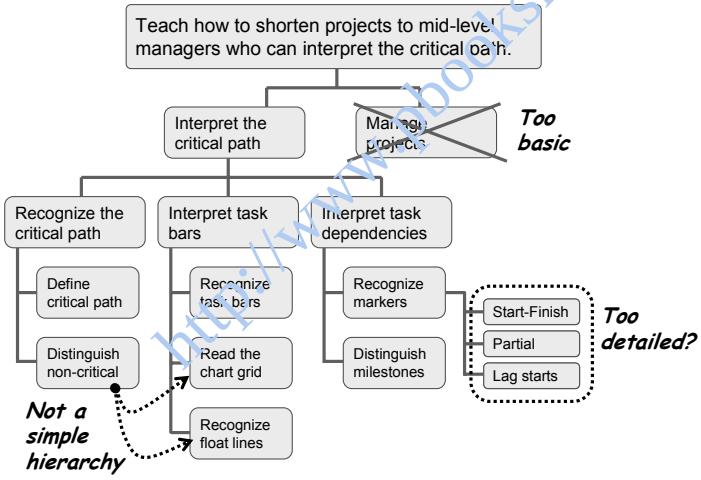


Here's a best practice for you. The best tools for cataloging your streamlined learning objectives are a whiteboard or Post-it® notes because they make it easy for you to change your mind.

Hierarchy of learning objectives

Our cascade of learning objectives and their prerequisites naturally forms a tree-structure or hierarchy. For example, let's look at the analysis that was conducted for the *Using Gantt Charts* course. It started with the top-level objective, to teach how to shorten projects to mid-level managers who can interpret the critical path.

For that objective, I identified two prerequisites, namely the ability to interpret the critical path (which I mentioned earlier) and to manage projects generally. Interpreting the critical path had prerequisites of the ability to recognize the critical path, interpret task bars, and interpret task dependencies. Recognizing the critical path required the ability to define the critical path and distinguish non-critical paths from critical paths. Interpreting task bars required the ability to recognize task bars, to read the chart grid, and to recognize float lines. Interpreting task dependencies required the ability to recognize dependency markers and to distinguish milestones from dependency markers. Recognizing markers required the ability to recognize three types of markers: start-finish, partial completion, and lagging starts. The actual analysis was a bit more complex than this, but essentially of the same structure.



Looking at this tidy hierarchy, it is tempting to proceed to the next step. We should not do so without dealing with some of the traps that often lurk at this stage. For one thing, some of the objectives may be too basic or too vast to fit within the scope of the project. For example, the objective of being able to manage projects is too elemental to fit in a course on using Gantt charts.

Another trap in such a neat hierarchy is that we may assume it represents all the prerequisite relationships. A closer look reveals that distinguishing non-critical from critical paths requires the ability to recognize float lines and to read the chart grid, which

were earlier identified as prerequisites for interpreting task bars. The relationships among objectives are clearly not a simple hierarchy.

Scanning the lower-level objectives may also cause us to question whether some objectives are too detailed or esoteric to be included directly. We might consider omitting these objectives or putting them in reference materials. One suspect area is the details about the different types of dependency markers.

One final trap is to automatically adopt this hierarchy as the structure for the course menu. Sometimes that is a good idea, but often it is not, especially if we feel that prerequisites should be taught first.

Identify prerequisites

How do we quickly and systematically identify the prerequisites for a specific objective? There is no magic formula, but careful analysis of objectives will help. For example, we might identify component skills as prerequisites. Component skills are lower-level parts of a higher-level skill. For example, if a procedure has five steps, each step might be a component skill of that procedure. Another category of prerequisites is definitions. Unless learners have the basic vocabulary of a field, they cannot learn the more advanced aspects of that field. Concepts may be needed when we want to go beyond rote learning and enable creative problem-solving. Rules and regulations may be required to inform learners of the constraints on how they can apply their learning. Here are some common prerequisites for different types of objectives:

Type objective	Common prerequisites
Do procedure X to accomplish Y.	Be able to **do** the individual steps of the procedure. **Feel** confident to perform the procedure. **Decide** to perform the procedure.
Decide X.	**Know** rules that govern the decision. **Know** what choices are available. **Know** the consequences of each choice. **Know** principles and concepts that can guide the decision. **Believe** that the decision is necessary. **Feel** positively toward the correct choice.

Type objective	Common prerequisites
Create an X that does Y.	**Do** procedure for planning or building. **Know** requirements for Y and rules governing the process. **Decide** approaches to take. **Feel** open to new ideas.
Know X about Y.	**Know** terms necessary to understand X. **Know** supporting facts, processes, and concepts.
Believe X.	**Know** facts, concepts, and principles that support X. **Feel** that X is important.
Feel X about Y.	**Believe** something about Y. **Know** something about Y.

Decide how to accomplish prerequisites

The second part of our inquiry into prerequisites concerns how we deal with these prerequisites. The stock, standard, default response is to just keep adding objectives. That is the process used in constructing the hierarchy of objectives for *Using Gantt Charts*.

Another alternative may be to let learners figure out the prerequisites by trial and error or by discovery learning. Many learners may welcome the challenge of filling in bits of missing information. Or we could teach the prerequisites as part of teaching the objective they support. We could select learning activities that are rich enough to teach some prerequisite objectives as well as the main objective. Still another approach is to teach learners how to look up the information on their own. If objectives can be met by accessing freely available Internet resources, why develop new learning content to meet the objective? We could also target fewer learners. If only a few of the targeted learners lack certain prerequisites, it may not make sense to develop content for just those few.

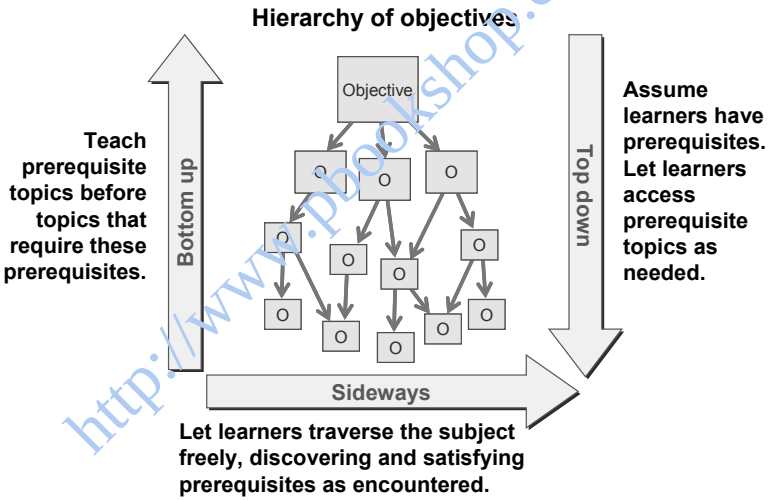
The option of adding more objectives should not be our automatic response to a prerequisite. E-learning seldom succeeds when it tries to accomplish too many objectives.

Decide the teaching sequence of your objectives

Once you have identified what objectives you must teach, you need to decide the order in which learners will accomplish these objectives. You can defer this decision until you have created learning objects, but only if your objects are designed with no assumptions about which objects learners will have taken earlier. Beware the as-shown-above-syndrome (p. 313).

One way to manage this decision is to make a preliminary strategic decision early in the design process and then to refine the decision on later design revisions. To that end, you can use the ideas here to decide a sequencing strategy and then those of Chapter 7 to craft purpose-specific learning sequences.

In what order you we teach? To decide, let's return to the hierarchy of learning objectives. Three main sequences are possible.



The most common sequence is bottom up. In a bottom-up sequence, we teach prerequisite objectives before objectives that require these prerequisites. Makes sense. Unless we teach the prerequisite first, learners could become confused or frustrated.

A second sequencing strategy is top down. In a top-down sequence we start learners at the top objective, as if they have all the prerequisites. Learners who lack prerequisites can continue down the hierarchy to access the objects that teach prerequisites they lack.

The third sequencing strategy is sideways. Here we let learners traverse the subject freely, discovering and satisfying prerequisites as encountered.

Example: Bottom-up sequencing

The course *Good Clinical Practice* had a bottom-up structure. This course dealt with a critical subject with life-or-death consequences. Its goal was to teach experienced medical researchers to follow regulations and ethical practices in conducting tests on human subjects, some of whom had died due to lapses by researchers.

The structure of the course is made evident by the **Next** button in the lower right, suggesting a strongly recommended path through the course.

Built using Adobe Dreamweaver.

The legal concerns were great. The course was mandatory. Every learner was required to complete every page of the course. A sequential structure aided that goal.

Let's look at the sequence of topics within a lesson on obtaining the informed consent of test subjects before conducting experiments on them. The lesson starts with a definition of informed consent as this is the basis of the whole lesson. Next, the lesson introduces the general principles of informed consent that will guide the researcher. Next are spelled out the specific elements of the document used to record informed consent. After that come details of the process through which the document goes to fully secure and document informed consent.

With all the background established, the lesson now provides specific details about obtaining consent from the test subject. Finally, it specifies the requirements the researcher must follow to document informed consent. The following pages provide a practice activity and a summary.

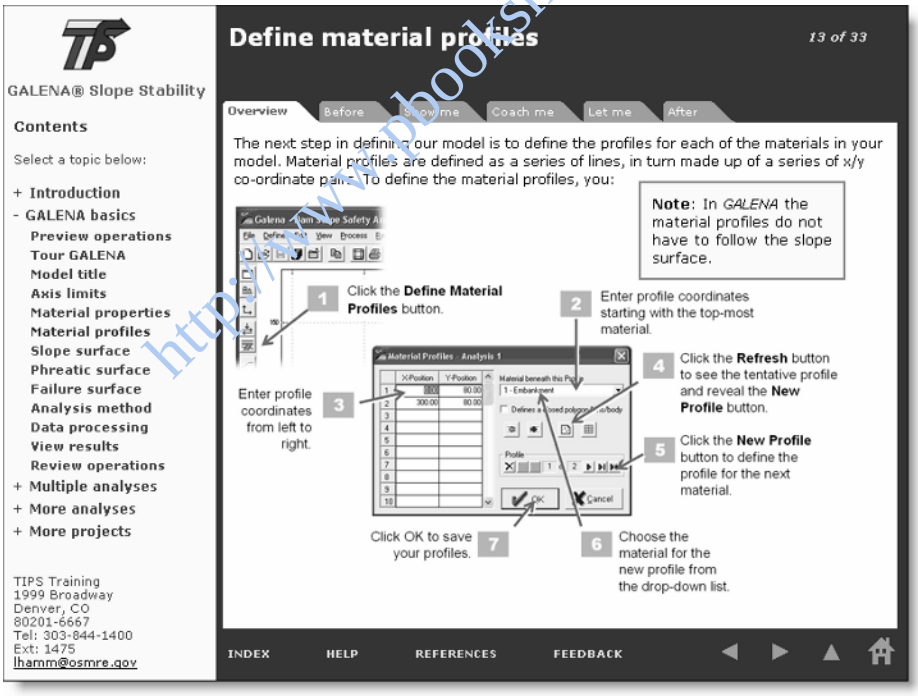
Did you notice how the lesson carefully begins with definitions, fundamental concepts, and contextual background before presenting the exact procedure the researcher must follow. That order is a classic example of the bottom-up sequence.

Example: Top-down sequencing

Let's look at an example of a top-down sequence. This example teaches operation of the *GALENA* Slope Stability Analysis computer program which is used to analyze the stability of earthen dams, road cuts, surface mines, and other slopes.

After an introduction, the course starts with a preview of the entire process of using the program. As part of this preview, the learner can select a show-me demonstration (p. 54). The demonstration provides a narrated, over-the-shoulder look at the use of the program to analyze an earthen dam. The demonstration is complete. If that is all the learner needs, the learner can quit the training and begin using the program.

If not, the learner can continue for more detailed instruction on how to perform each of the steps shown in the overview.



Tabbed interface built using Adobe Dreamweaver and custom JavaScript. Screens captured with TechSmith SnagIt. Illustrations created in Microsoft PowerPoint.

For example, if the learner selects the Material profiles step, the lesson on how to define the cross section of a slope model appears. Note that this lesson also has a top down

structure. The first tab presents an overview or summary of the required steps. If that is all the learner needs, the learner can continue with another lesson or begin using the program.

Within the lesson is a **Show me** tab containing a demonstration elaborating on the steps summarized in the overview.

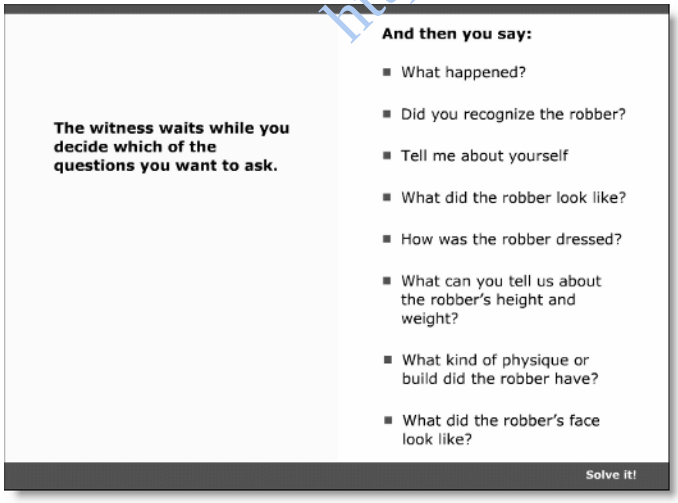
For even more detailed instruction, the learner can click the **Coach me** tab and launch a coached simulation (p. 150) of how to perform the task of defining material profiles.

Even within this simulation, the structure is still top-down. (Navigation within the simulation is shown on page 342.) The learner proceeds through the simulation receiving no explicit instructions until needed. If the learner makes a mistake, the system displays an error message to correct the mistake. Another way the learner can receive instruction is to press the **Hint** button. The **Hint** button dispenses a suggestion to guide the learner's thinking toward discovery of the next step. If the learner is truly stumped, he or she can click the **Show how** button to get explicit instructions on how to proceed.

At the course, lesson, and simulation levels, learners are presented with prerequisite information only when they request it or demonstrate they need it. That is the essence of the top-down sequence.

Example: Sideways sequencing

The sideways sequence is most common in learning games and simulations. Here is an example. It is called *The Crimescene Game*. (See page 142 for more.) It teaches interviewing skills by having the learner simulate interviewing the witness to a crime. The learner conducts the interview by selecting from possible questions or responses.



Once the learner completes the introduction to the game, a menu of possible paths appears. Here the learner can choose from a range of questions to ask the witness. The learner can pick them in any order.

Created in Microsoft PowerPoint and converted for Web delivery using Articulate Presenter. View example at horton.com/eld/.horton.com/eld/.

The menu and the paths that issue from it take the learner through the learning object's scenes. Within each scene, the learner can choose what follow up questions to ask and how to respond to comments by the witness.

Let's say the learner asks how the robber was dressed. The learner would receive some information and have a choice of whether to probe deeper or ask a different question. If the learner probes more deeply, more information is revealed.

At this point the learner might decide to ask a different question. That takes the learner back to the menu of questions to ask additional questions in any order the learner chooses. That is, the learner decides how to proceed through the interview.

No two learners may conduct the same interview. The feedback one receives is thus unique, depending on the questions asked. By repeatedly playing the game, the learner eventually receives feedback to correct all the misconceptions he or she is prone to. This indeterminate path is what we mean by a sideways sequence.

Where would you use each sequencing strategy?

Where would you use each of these sequencing strategies in your e-learning? For what groups of learners, for what subjects, and for what objectives is each strategy appropriate?

Let's start with the bottom-up sequence. The prerequisites-first sequence is often necessary where safety is a concern. If missing information or misconceptions could endanger the learner, we must make sure they receive such prerequisite information before encountering the need for it. Novices also benefit from a bottom-up structure because novices, by definition, lack extensive knowledge in a field. The bottom-up sequence is so common in school learning that we often use it for students whose model of learning is based on traditional schooling.

Now, how about the top-down sequence? The top-down sequence is often used for efficiency of learning. Learners encounter only the content they explicitly request or clearly need. Nobody wastes time covering material already mastered or not relevant.

The top-down sequence is also good for experts who already know much of a subject and can quickly identify gaps in their own knowledge and skills. Top-down sequencing is well suited for just-in-time learning where learners seek out just the nuggets of learning they need at the moment of need.

So where do we use the sideways order? The sideways order, because it is less predictable, can add excitement to the learning process. It is a good choice for discovery learning where learners must discover and integrate separate bits of knowledge. And it is good where you are teaching learners to learn on their own as they cope with a complex, dynamic situation—like many work environments today.

Create objects to accomplish objectives

Now that we have identified our prerequisites and narrowed them to the ones the course will directly accomplish, it is time to plan how we will accomplish those objectives. It is time to start specifying modules of learning for each objective. And that leads us to learning objects.

What is a learning object?

What do we mean by the term *learning object*? Let's start with a simple definition:

> **A learning object is a chunk of electronic content that can be accessed individually and completely accomplishes a single learning goal and can prove it.**

That's a mouthful, so let's look it a bit at a time:

chunk of electronic content	A learning object is not an ephemeral concept but a concrete collection of electronic media. It contains text and graphics and perhaps animation, video, voice, music, and other media.
can be accessed individually	Through a menu, search engine, or just a Next button, the learner can get to just this piece of content apart from other pieces. That is, this piece appears to the learner to be separate from other objects.
completely accomplishes a single learning goal	The key characteristic of a learning object is that it accomplishes a learning objective. The objective may be narrow or broad.
can prove it	The object contains the means to verify that the objective was met. This may be a simple test or a sophisticated simulation. A score may be recorded or not. In the end, though, the learner or the organization offering the object can tell whether the objective was met.

A simpler, although less precise definition is this:

> **A learning object is a micro-course designed to be combined with other micro-courses.**

If a course is a unit of education that can be completed in some number of hours, then an object is a similar unit that can be completed in some number of minutes. An object is smaller, but still complete. An object may teach less than a course, but it teaches it equally well.

What a learning object is not

The term learning object is used quite loosely. The term is applied to many things that are not true learning objects. To understand what we mean by the term, let's focus on some of the things a learning object is not.

A learning object is not a shrink-wrapped product you can buy. Although many vendors use the term in referring to their content and tools, a learning object is much more than a single, simple product. It is more like a philosophy for developing and packaging reusable content.

Likewise, learning objects are not a proprietary tool or technology. They depend on tools and technology but are not the province of any particular vendor.

Some learning objects can contain other learning objects which contain still other learning objects. This hierarchy means that learning objects can be entire courses or just individual components of a course.

Because learning objects can contain a hierarchy of other learning objects, a learning object is not always a single file. At the bottom of this hierarchy each object may be a file or page, but clearly higher-level objects cannot be limited to single files.

The definition of learning objects is not always apparent to the learner. Nor should it be. Learners just want to acquire new skills, understanding, or information. They do not care where one learning object leaves off and another begins. As long as they can navigate and access the knowledge they need, learners are happy. Only designers and builders need be highly concerned with the precise definition of learning objects.

Learning objects can serve multiple purposes. And an object-based development method can work for different kinds of courses. Learning objects can be used for training, for reference information, for quick-reference to facts, for job aids, and even for games and other forms of entertainment.

Common nonsense about objects

The Lego block analogy

A Lego block is a toy made by the Danish Lego company. There seems to be an ISO standard that requires that all speeches, presentations, and documents on learning objects whether in person, on paper, or online, must contain at least one picture and three verbal references to Lego blocks as a metaphor for learning objects.

If what you teach is as simple as a Lego block, you do not need learning objects. You do not need e-learning. You probably do not need any formal learning efforts at all.

The Universal Hamlet Object

Advocates for learning objects point out how much money school systems could save if, instead of each teacher of Hamlet creating his or her own course content, everybody just reused a single object teaching Hamlet.

This analysis makes a point: We do waste a lot of time recreating content someone else has created and polished. It fails because no Universal Hamlet Object is possible. The value of Hamlet as a school subject is that the teacher can use it to broach many different subjects. The other problem with this analysis is that not all subjects are as universal as Hamlet. Many of the most valuable things we learn are idiosyncratic and highly individual.

FAM (Forego Abbreviation-Mania!)

People who discuss objects love their abbreviations. Their conversations sometimes sound like this: "That AU is really several RLOs. I'd break it into several RIOs, but I bet you'd make them SCOs." Here are some of the most common abbreviations so you can decode such conversations:

RLO = reusable learning object

RCO = reusable content object

RIO = reusable information object

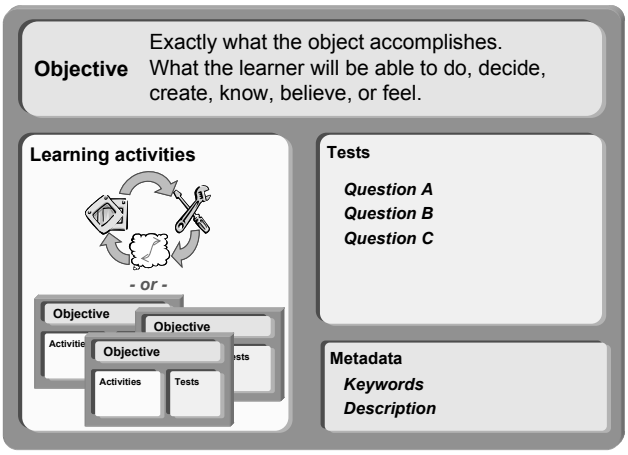
AU = assignable unit

SCO = sharable content object

Do not be intimidated by such technobabble. Sure, there is nothing wrong with using abbreviations for conciseness, but please forego trying to impress others with how many TLAs and FLAs you can cram into a sentence. (TLA = three-letter abbreviation and FLA = … well you can figure it out, can't you?).

Turn objectives into learning objects

Each objective leads us to create a learning object that completely accomplishes the learning objective and can prove it. As such, learning objects can be whole courses, lessons, or just individual topics. Chapters 6 and 7 tell how to design topics and lessons as learning objects.



The starting point for designing the object is the objective it is to accomplish. The objective is also the ending point and a constant reference when designing the object. Anything that does not contribute to accomplishing this objective should be omitted forthwith. The objective statement created earlier makes a fine charter for the learning object. Although the learner may not see the objective statement, every designer and developer should see it and work to accomplish it.

Once we have defined the objective, we can begin to specify the content necessary to meet that objective. There are two ways we can specify content. For a high-level learning object, we may specify sub-modules, that is, a structured sequence of learning objects for more specific objectives.

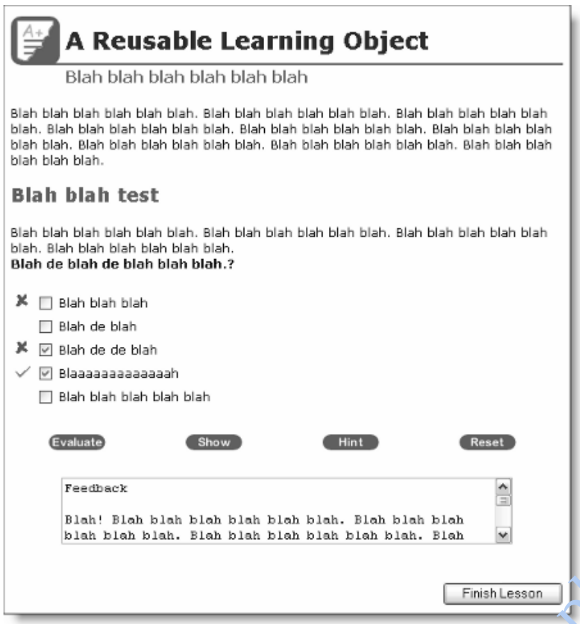
For low-level learning objects, we may specify learning activities that will directly accomplish the objective of the learning object. These learning activities may occasion a variety of learning experiences.

Tests are another part of the object. Tests verify that the learning objective was met. The test might be a simple self-check to let the learner decide whether to move on. Or the test might be a formal test with a recorded score. Our diagram shows tests as questions because that is the most common form of a test, especially for a cognitive subject. Just keep in mind that other types of tests are possible, such as simulations, games, and work assignments.

In addition to content, the learning object may require other components such as indexing keywords to help learners find the object and a description to appear in a course catalog. Although not directly part of the content, these components, called *metadata*, assist in meeting the goal by making the learning object easier to find, understand, and remember.

Following standards is not enough

Merely following standards does not make content into a learning object. And standards do not make objects reusable … or even usable in the first place.



Here is an example of an object that follows SCORM standards. It has a test that reports scores to a SCORM-conformant learning management system.

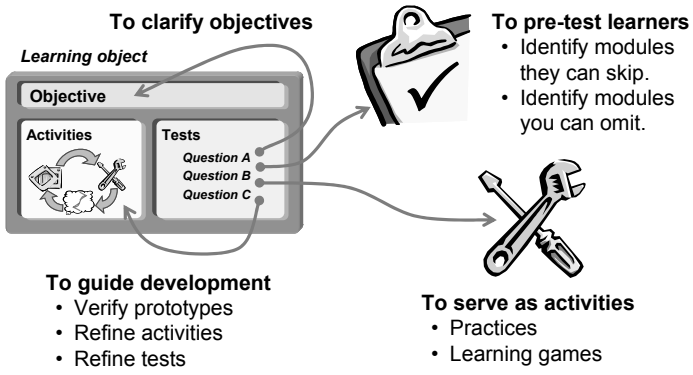
If you look closely you will see that no one will ever learn anything from this object because it is filled with nonsense. It may be an object—but it is clearly not a learning object.

Yet it meets the SCORM standard (p. 399).

Create tests

Tests gauge accomplishment of the objective. They can range from small tasks that give the learner confidence to move to the next object all the way to formal tests used to legally certify the learner's skills. Chapter 5 will help you design effective tests.

A learning object requires both learning activities and tests. Most people create the learning activities first and then, if time permits, tack on a few multiple-choice test questions. A better approach is to create the tests as soon as you have defined the learning objective. It may seem illogical to create the test before creating the learning that the test measures, but the test is the best guide to designing learning activities. By developing tests first, you save time and money while making your testing and teaching more effective.



Tests clarify the objective. There is no clearer and less ambiguous statement of a learning objective than a test question that measures whether that objective has been accomplished. If the test is valid, passing the test indicates accomplishing the objective. Rather than struggle through a complex methodology for writing objectives, focus your efforts on writing good test questions.

You can then use the tests to pre-test learners. Such pre-tests will identify objects that learners can skip. More importantly, pre-tests used early in the development process can identify objects you can omit because the tests show learners already can meet the objectives.

Tests can often serve as the learning activities for the object. Tests can be designed as practices, learning games, simulations, or work assignments.

Tests can guide you in the development of content. Tests can verify prototypes for learning experiences. If learners take the prototype and pass the test, the prototype is working. Tests can help refine learning activities by comparing the learning results from different designs or variations. Having tests available early gives time to refine the tests, sharpening the focus and removing ambiguity.

So develop tests first and then the learning activities necessary to prepare for the tests.

Select learning activities

Activities are necessary to provoke learning experiences. Used in combination, learning activities can accomplish difficult learning objectives.

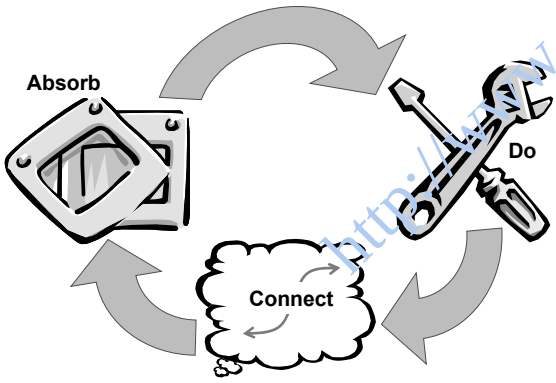
Learning activities exercise basic skills, thought processes, attitudes, and behaviors. But mere action is not a learning activity. People learn little by merely clicking the mouse or chatting about vacation plans. People learn by considering, researching, analyzing, evaluating, organizing, synthesizing, discussing, testing, deciding, and applying ideas. Activities may use mouse clicks and chat sessions, but their goal is to provoke the exact mental experiences that lead to learning.

To accomplish learning objectives, we typically require three types of learning activities: *absorb*, *do*, and *connect* activities. What are they and why do we need them?

What kinds of activities do you need?

With clever design, any kind of activity is possible. If you can do it in a classroom, you can do it in an e-learning course. But do you want to? What kinds of learning activities should you create? To accomplish a learning objective usually requires three distinct types of learning activities.

One type has the learner absorb knowledge, typically by reading text, watching an animation, or listening to narration. In an absorb activity, the learner is physically passive, but mentally active.



A second type of learning activity has learners do something with what they are learning. It might have the learner practice a procedure, play a game, or answer questions. The learner practices, explores, and discovers.

The final type of learning activity has learners connect what they are learning to their work, their lives, or their prior learning. Connect activities are aimed at making it easier to apply learning when it is needed later.

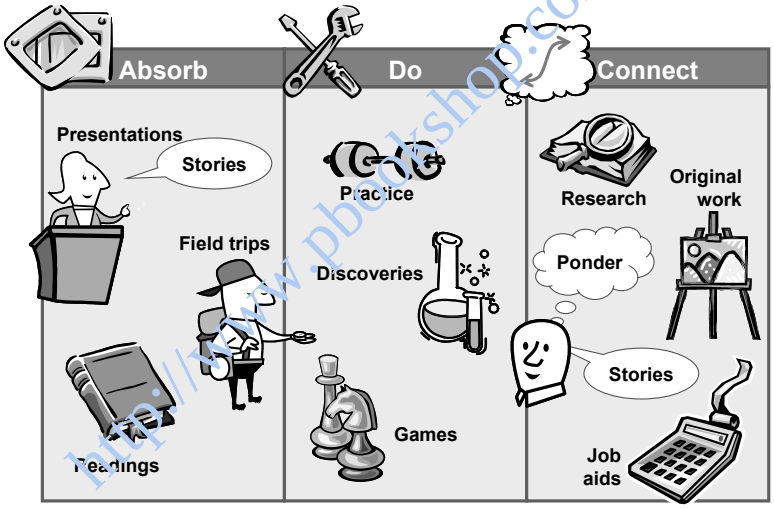
These three activities are shown as a cycle starting with the absorb activity. This is the most common sequence for cognitive subjects, but it is not a requirement and not always the best sequence. Different types of subjects and different instructional strategies will demand a different sequence.

Proven learning experiences

Consider learning experiences in your life. Can you classify them as absorb, do, or connect activities? Remember that *absorb* activities typically have the learner read, watch, and listen. *Do* activities have the learner do something with knowledge, such as practice, explore, and discover. *Connect* activities lead the learner to connect current learning to life, work, and prior learning.

Common types of learning experiences include discovery activities, field trips, job aids, original work assignments, ponder activities, practice sessions, readings, research, stories told by the teacher, and stories told by the learner. Which are **absorb**, which are **do**, and which are **connect** activities?

Here's how I classify them—which is important only in that that is how they appear in the rest of this book.



Absorb-type activities

In the absorb column are activities during which the learner reads, listens, and watches.

Presentations lurk at the left edge of the absorb column, as all the learner can do is look and listen. We hope the learner absorbs the information in the presentation actively.

Stories by the teacher are likewise absorbed by the learner.

Readings include activities for which the learner reads from online or paper documents, such as textbooks, research papers, or technical manuals.

Field trips are at the right edge of absorb activities. Although the learner may be physically active on a field trip, the learner learns by absorbing information. In a field trip to an art museum, for example, the learner may learn by looking at paintings, reading their descriptions, and listening to a museum docent lecture about them. A field trip to a hands-on museum, such as the Exploratorium in San Francisco, however, would be more of a do activity, as learning occurs through experiments and discovery.

Do-type activities

In the do column we place activities during which the learner actively exercises, explores, and discovers.

Practice activities fall squarely in this column. They allow learners to apply skills, knowledge, and attitudes and receive feedback on their efforts. They help learners refine and polish learning. Practice activities can range from simple drill-and-practice exercises to sophisticated guided-analysis activities.

Discovery activities are times for experimenting and exploring. Their goal is to lead the learners to discover concepts, principles, and procedures for themselves.

Games and simulations let learners learn by attempting to apply skills in a safe environment. Learners can gain insights and confidence as they solve realistic problems in an entertaining context.

Connect-type activities

Connect activities lead learners to link what they are learning to prior learning and to situations in which they will apply the current learning in subsequent courses or on the job.

Research activities, during which learners must identify learning resources on their own, are connect activities, as they require accessing and interpreting outside resources.

Ponder activities ask the learner to stop and think about the subject more broadly and deeply. They encourage the learner to view the subject from a new perspective. They are typically used for connecting to what the learner already knows.

Stories told by learners require the learners to draw on their own experiences. They require the learner to connect the subject of learning to personal experiences.

Job aids are used on the job at the time when learning must be applied. As such they help connect learning to work.

Performing **original work** is the ultimate final exam. It fully connects learning to the life of the learner.

Can't wait to learn more about these activities? Here are some destinations for you:

Absorb activities (Chapter 2)	**Do activities** (Chapter 3)	**Connect activities** (Chapter 4)
Read, watch, and listen.	Exercise, experiment, and discover.	Link to prior learning, to work, and to life.
▶ Presentations and demos (p. 49). ▶ Stories by the teacher (p. 72). ▶ Readings (p. 78). ▶ Field trips (p. 89).	▶ Practice (p. 106). ▶ Discovery (p. 125). ▶ Games (p. 141).	▶ Ponder activities (p. 169). ▶ Stories by the learner (p. 75). ▶ Job aids (p. 183). ▶ Research (p. 194). ▶ Original work (p. 206)

Where did this list come from?

The activities we identified have been essential for learning in different eras, from different cultures, for different learners, on different subjects, and in different media. If the same technique was used three thousand years ago in Asia for face-to-face religious instruction and today in Canada for satellite TV training in business management, then it is a very powerful and versatile technique indeed.

We chose them because they are proven and flexible activities. When well designed and appropriately deployed, they work well. They can be adapted to work with any subject matter. Many can be used with the class as a whole, by small teams, by individuals monitored by the instructor, and by learners working alone.

Specify learning activities to accomplish the objective

It is one thing to know what types of learning experiences we need. It is another to list the exact learning activities we need to accomplish a specific learning objective.

Here's how we go about it. We start with a slot for the objective of our learning object. We consider the three types of essential activities we will need: absorb, do, and connect. For each of these types, we need to describe the actual experience. And we need to specify the order in which each experience occurs. For example, let's specify learning experiences for an objective from the *Using Gantt Charts* course.

Objective	Teach how to interpret a Gantt chart to mid-level managers who recognize the individual symbols.

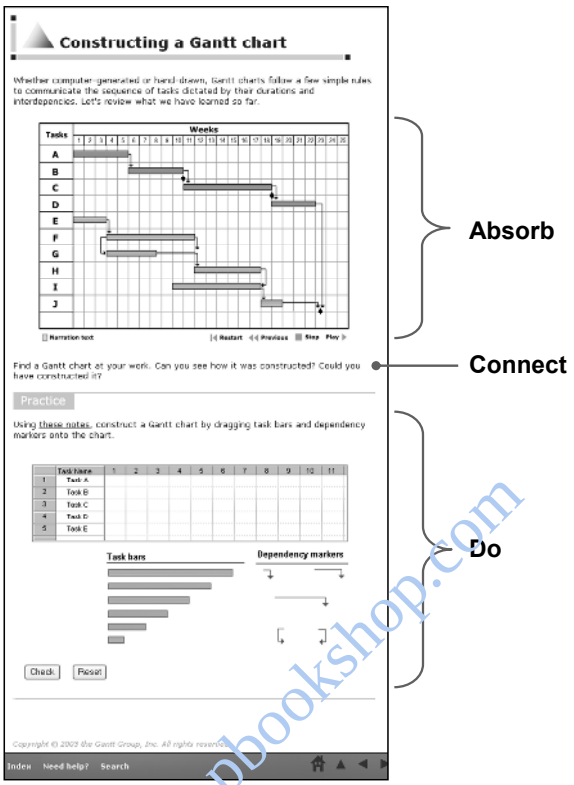
Activities	Type
Watch a narrated animation of a typical Gantt chart being constructed.	Absorb
Examine Gantt charts at work to see how they were constructed.	Connect
Construct a similar Gantt chart by dragging and dropping pieces into place.	Do

We might start with an absorb activity that has the learners watch a narrated animation of a typical Gantt chart being constructed. Next, we might include a connect activity that guides learners to examine Gantt charts in their environment to see how they were constructed. We could close with a do activity that requires the learners to construct a similar Gantt chart by dragging pieces into place.

Although we have listed the experiences in order by absorb, do, connect, I chose to teach this objective by making the absorb activity first, then the connect activity, and finally the do activity.

Example of essential activities

Let's look at how these essential learning activities were implemented. Here you see the resulting learning object.



View example at horton.com/eld/.

At the top of the page is an animated presentation with voice-over narration. The animation shows the construction of a simple Gantt chart. Watching the animation is the *absorb* activity.

At the bottom is a practice activity that lets the learner construct a Gantt chart by first popping up a description of the tasks of a project and then dragging symbols into place representing the project. This practice implements the *do* activity.

Above the practice activity is a ponder activity. It invites learners to find a Gantt chart in their work. It then asks whether they can figure out how it was constructed and whether they feel they could have constructed it. Answering this rhetorical question makes up the *connect* activity.

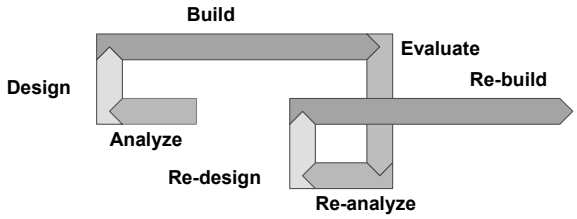
More examples of learning activities

Here are several sample objectives and potential learning activities to accomplish them:

Objective	Learning activities
Decide where to use the chemical element niobium.	Absorb: Presentation on chemical properties. Do: Practice deciding whether to use niobium for specific goals. Connect: Identify some uses for niobium in your work.
Predict consequences of mixing TrueType and PostScript fonts in one document.	Absorb: Presentation on what happens if different types of fonts have the same name. Do: Classify samples of formatting problems as caused by font mismatch or not. Connect: Examine and report on the fonts installed on your computer.
Decide whether a main bank can delegate to an association bank the authority to make loans.	Absorb: Watch and listen to a presentation of legal problems that resulted due to improper delegation. Do: Find rules concerning delegation in online policy manuals. Do: Decide in several scenarios whether the main bank properly delegated authority. Connect: Research policies at your own bank.

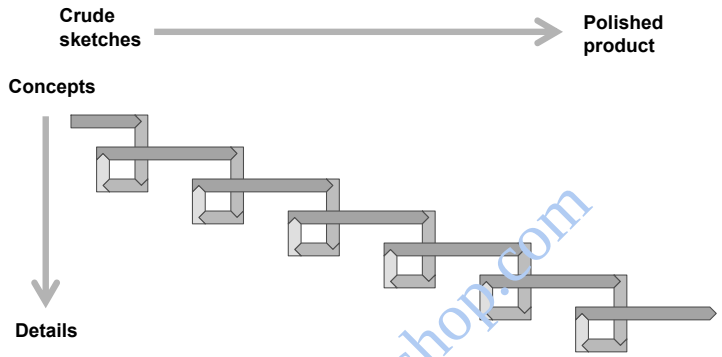
THEN REDESIGN AGAIN AND AGAIN

Design of e-learning never follows a smooth and straight path. First you analyze your requirements and design your e-learning. Then you build it and test it. Oops! Better analyze the results and redesign a bit. Then you need to build in a few changes and test again. And so it goes.



Re-design but do not repeat

The design process proceeds in a cycle of analyze, design, build, and evaluate. The evaluation in one cycle becomes research for the analysis in the next cycle. Thus, design is a series—sometimes a seemingly endless series—of decisions. The design process is essentially cyclical, corkscrewing in from high level to detailed issues while continually revisiting the same requirements over and over again.



Not your sequential ADDIE process

If you are familiar with the ADDIE (Analyze, Design, Develop, Implement, and Evaluate) process, you may think we left out one of the phases. Not true. We just consolidated Develop and Implement into Build. Two reasons: One, since e-learning is delivered over networks, the implementation is a natural part of development. And two, since the process is iterative—as opposed to sequential, implementation does not lag development but goes on at the same time.

Make steady progress

The design process involves top-down design gated by testing at every level and tempered by a willingness to back up and start over where called for. At the beginning, you deal with high-level issues and work with a crude prototype, perhaps nothing more than a stack of sketches on index cards. At the end of the process, you are fine-tuning individual pixels of the final e-learning.

IN CLOSING ...

Summary

E-learning uses computer and network technologies to create learning experiences. Varieties of e-learning include standalone courses, virtual-classroom courses, mobile learning, embedded e-learning, blended e-learning, simulations, and learning games.

The advantages of e-learning are not automatic nor are the disadvantages inevitable. Good design makes all the difference. Designing e-learning requires more than traditional instructional design. Designers must incorporate ideas from software engineering, select and combine new digital media, and work under tight economic constraints.

Start with clear goals and objectives so you do not waste time and effort or just bores or distracts learners. Systematically identify the prerequisites for each learning objective you must accomplish and decide how learners will achieve each prerequisite. Specify the learning activities to accomplish each objective. Determine what knowledge the learner must absorb, what the leaner must do with the knowledge, and how the learner will connect the knowledge to work and life. Invest in good tests. Tests will (1) tell you how well your design is working, (2) help learners monitor their own progress, (3) show what content learners can skip and what content you can omit, and (4) make your objectives crystal clear.

Build your e-learning using iterative cycles of analysis, design, building, and evaluating. Start with big-picture issues and proceed to low-level details.

For more ...

The rest of this book will guide you in carrying out the steps shown in the overview provided in this chapter. For more on designing learning activities, flip to Chapters 2, 3, and 4. For help creating tests, go to Chapter 5. If you want to start designing learning objects, turn to Chapter 6 on Topics and Chapter 7 on Lessons. For higher-level design issues affecting the course as a whole, turn to Chapter 8.

As far as instructional design is concerned, this chapter was just a crib sheet. For the complete book, pick up *Multimedia-Based Instructional Design* by William Lee and Diana Owens or *Principles of Instructional Design* by Robert Gagné.

Or, search the Web for: *e-learning and "instructional design."*