12 Lessons

Online chapter for
E-learning by Design
(2nd edition)

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Lessons

Accomplishing broad educational goals

A lesson accomplishes a complex learning goal. This goal may be a broad objective that cannot be taught in a single topic. It may be a complex one that cannot be divided into simpler objectives. Or it may represent a cluster of closely related objectives that benefit from being learned in rapid succession.

A lesson may be taught by a unified, but multi-faceted, activity or by a coordinated set of learning objects for component objectives.

A lesson is larger than an individual topic and smaller than a whole course. In many ways, a lesson is a miniature course with its own objectives, introduction, summary, learning activities, and assessments. A lesson is like a super-topic, accomplishing a more ambitious goal than a simple topic.

A lesson itself may be designed as a learning object—self-contained and completely accomplishing its objective. A lesson may also contain or refer to learning objects for topics that accomplish lower-level objectives or meet prerequisites. A lesson can be precisely structured with navigation among its learning experiences carefully scripted. Or it may be a more open-ended environment in which learners have free-range to pursue a variety of learning activities.

First we will look at how combining learning activities lets us accomplish broader and more ambitious objectives. Then we will consider some common ways of sequencing activities in lessons. Finally we will look at how lessons can be designed as learning objects.
The individual learning activities of Chapters 2, 3, and 4 and the topics of Chapter 6 can be combined to accomplish more ambitious goals and to create richer, more sophisticated learning environments.

Simple, single learning activities hardly make for revolutionary learning—until you start combining them in creative ways to build much richer learning experiences.

First, what do you want to teach? Think of an especially difficult concept or procedure. Now, what coordinated combination of learning experiences can accomplish your goal? It may help to list them and sketch a diagram showing relationships among the separate experiences.

Suppose we want to teach remodeling contractors how to obtain approval from the architectural review committee for a historic neighborhood.

The first activity might ask learners to read the assignment for the lesson. This is usually the first step for a complex activity. Because we want to use a role-playing activity, we encourage learners to research the roles they will play.

Our first collaborative activity might be a chat session during which learners can ask questions of an expert on the procedure of obtaining the necessary permits. Learners would participate in this activity in their assigned roles.

Next learners might simulate the meeting of the review committee. During and after the meeting, participants might vote on whether to grant the requested permit. The meeting should be designed to foster a cycle of activities, the first of which is analyzing the opinions of others.
Learners might then read materials to try to develop arguments to sway the opinions of others, sparking the need to write responses to those opinions. This would provoke more discussion, which would require more analysis, thus starting another cycle of analysis, research, and communication.

The next step is to create learning materials to provoke these planned learning experiences.

Here is the resulting lesson. It is a compound activity designed to provoke the required learning experiences. Notice the different tabs for different aspects of the activity.

This is the way to design lessons. Start with objectives and decide what learning experiences will accomplish those objectives. Then create materials to provoke and sequence those learning experiences. The key to effective lessons is to think first of the balance and flow of learning experiences and only later about content.

**WAYS OF ORGANIZING LESSONS**

Lessons can be organized into several generic structures, such as a linear sequence, a branching hierarchy, or a two-dimensional grid. Although these generic structures have their place, most e-learning is structured in ways that reflect the needs of learners and the nature of the subject matter. We call these organizations “purpose-specific” and design them around the subject matter and the learners’ need for knowledge.
## Common kinds of lessons

Let’s briefly recap the lesson types and where to use them.

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<tr>
<th>Structure</th>
<th>Description</th>
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<tr>
<td><strong>Classic tutorials</strong> (p. 7)</td>
<td>After an introduction, learners proceed through a series of topics, each teaching a more difficult concept or skill. At the end of the sequence are a summary and a test. Within the topics, teaching skills and concepts are examples and practice activities.</td>
<td>To teach basic knowledge and skills in a safe, reliable, and unexciting way.</td>
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<td><strong>Book-like structure</strong> (p. 12)</td>
<td>The lesson is organized as a hierarchy of general and specific areas. Learners can navigate the lesson sequentially as if turning pages, drill down to a specific topic, or consult an index or table of contents (main menu).</td>
<td>For subjects with a clear, accepted structure, especially if the lessons will be used for refresher learning or just-in-time learning.</td>
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<tr>
<td><strong>Scenario-centered lessons</strong> (p. 16)</td>
<td>The lesson centers on a major scenario about a problem or project. After an introduction and preparation, the learner engages in a variety of activities all relating to accomplishing the goals of the central scenario.</td>
<td>To teach complex concepts, emotional subjects, or subtle knowledge that requires rich interaction with the computer or other learners.</td>
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<tr>
<td><strong>Essential-learning tutorials</strong> (p. 23)</td>
<td>After an introduction, learners proceed through a series of tests until they reach the limits of their current knowledge. Then they are transferred into the main flow of a conventional tutorial, which ends with a summary and test.</td>
<td>To let impatient learners skip over topics on which they are already knowledgeable.</td>
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<tr>
<td>Structure</td>
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<tr>
<td>Exploratory tutorials</td>
<td>Learners find knowledge on their own. Learners navigate an electronic document, database, or Web site in which they accomplish specific learning goals. To aid in this task, they may use a special index and navigation mechanisms. Once learners have accomplished their goals, they view a summary and take a test.</td>
<td>To teach learners to learn on their own by developing their skills of navigating complex electronic information sources.</td>
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<td>Subject-specific</td>
<td>A free-form structure where each topic, activity, or page can potentially lead to any other. In practice the structure is organized by the logical organization of the subject or the flow of a scenario.</td>
<td>For subjects that have a distinct organization you want to teach. And for simulations when other structures would interfere with learning.</td>
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<td>structure (p. 35)</td>
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E-learning courses have evolved several ways of structuring lessons. These have the advantage of much experimentation and refinement. Before you start to design your own lesson structures, take a few minutes to consider some of the models presented here. These models are not meant to be solutions to your problems. Use them as a starting point for your own solutions.

**Classic tutorials**

Most e-learning lessons today are organized as the classic tutorial. This structure enables the same flow of learning experiences teachers have used for 50,000 years.

**Architecture of classic tutorials**

In the classic tutorial, learners start with an introduction to the lesson and then proceed through a series of topics teaching progressively more advanced skills or concepts. At the end of the sequence, learners encounter a summary or review of the concepts and a test or other activity to measure whether they accomplished the objectives of the lesson.
For each skill or concept taught, learners may experience a presentation on the subject, see an example of it in action, and practice applying it. The combination of presentation, example, and practice may be designed as a topic. This topic may be a learning object.

**Example of a classic tutorial**

This tutorial on using the critical path to streamline projects has the structure of a classic tutorial.

It begins with an overview or introduction to the tutorial.

Created in Microsoft PowerPoint and converted for Web delivery using Articulate Presenter. View example at horton.com/eld/.
The tutorial contains a map showing the overall structure. Notice that there are three main topics, each with a stop-and-think practice activity linked to the topic.

Let’s look at one of the topics. It is the one on shortening the critical path. It contains several pages of detailed information.

Associated with the topic is a practice activity. This activity asks learners to identify changes to a project that would shorten the critical path. Clicking a change reveals feedback for the item.

Practice activity created with Adobe Captivate.
Following the last lesson is a summary that recaps the important concepts in the tutorial.

The final element of the tutorial is a short, 4-question quiz.

Quiz created with Articulate Quizmaker.

When to use the classic tutorial structure

The classic tutorial structure is a safe, reliable choice. It is familiar to learners, especially to those who have taken conventional e-learning lessons. Learners seldom get lost in such a simple structure. It is flexible enough to adapt to many purposes, yet simple enough to create largely from templates. The tutorial structure also works well for simple training tasks, especially for cognitive subjects. Simple subjects typically require a clear explanation and a bit of practice. It is readily implemented as learning objects.

One drawback to the classic tutorial is its linear structure. Impatient or advanced learners resist plodding all the way through the sequence. We may need to give learners some alternative navigation paths.
The classic tutorial may not be the most efficient or effective, but it is simple and safe. With this structure, novice instructional designers cannot make mistakes so big that a little testing will not detect them.

**Variations of the classic tutorial structure**

There are hundreds of variations on the theme of the unstructured tutorial. Here are a few of the ways I have bent and twisted the classic tutorial structure to fit specific objectives.

- I find that many American and Canadian learners, upon first entering the lesson, experience an immediate itch to jump to the test to see whether they already know what the lesson teaches. For them, I put a button on each page to let them jump directly to the test at any time.
- Some learners, who are returning to the course as a refresher, will want to jump directly to the Summary—hence another button.
- I have also observed what I call “page flipping” behavior in this structure. Learners skip through the main sequence, without paying close attention, just scanning to see what topic the sequence contains. Only after they get well down that road do learners decide to actually take the lesson. For them, I include a menu so they can decide where to begin and what to repeat.
- In the classic tutorial, examples and practices are separate items off the main path. If examples and practices are short and simple, you may want to incorporate them onto the page of the skill or concept they demonstrate.

**Best practices for the classic tutorial structure**

The classic tutorial structure works well most of the time. As long as you keep it simple—and test to detect and correct problems—you should be able to use it for much of what you teach. When you use the classic tutorial, keep these suggestions in mind:

- **Do not try to teach too much.** Limit each sequence to no more than 7 to 10 simple skills or concepts; 3 to 5 would be better.
- **Do not omit practice activities.** Let people apply what they learn as soon as they learn it. Otherwise the main sequence turns into a boring page-turner.
- **Do not follow the structure mechanically.** Be practical, not dogmatic. Omit the parts of the structure you do not need. If you do not need an example, leave it out. If one topic does not require practice, fine. Consolidate short topics. I frequently put examples right on the main topic page.
► **Do not skimp on examples.** While you are being practical and omitting parts you do not need, take care to keep enough examples to ensure that learning really occurs.

► **Share control with learners.** Do not force-march learners from the beginning to the end of the tutorial. Let them skip topics they have already mastered. Let them repeat topics as many times as necessary.

**Book-like structures**

The book structure fits e-learning to an organization and metaphor that has been proven over the past 500 years.

**Architecture of the book structure**

The book structure resembles the organization and features of a reference book. It usually starts with an introduction or overview. From the introduction, learners may jump to the starting topic of specific sections. From each of these high-level topics, learners may jump to subtopics. For example, learners could jump from the intro to section 1 and from there to topics 1A or 1B. Each of these mid- and low-level topics could be a learning object.

E-learning organized in the book structure usually contains a table of contents that serves as a main menu from which learners can jump directly to any main topic or subtopic. The e-learning may also contain an alphabetical index like the one typically found at the end of a book. The index enables learners to find a topic by the type of
knowledge it conveys. Because learners can jump around the structure, they may encounter terms that they do not recognize. To prevent confusion, the book structure may offer an online glossary whereby learners can look up the meaning of abbreviations and technical terms. One addition to the book metaphor may be a search facility that lets learners type in a word or phrase to search for in the text of the e-learning.

As you can see, the book structure makes it easy to access individual topics, even out of sequence.

**Books are not tutorials**

The book structure is similar to the classical tutorial but differs in some subtle ways:

- Both contain hierarchical and sequential access, but the book structure emphasizes and encourages hierarchical (top-down) access.
- Topics are designed to be accessed in a sequence determined by the learner rather than the designer. Topics must be carefully designed so they can be consumed in any order.
- The book structure provides access mechanisms familiar in books, such as a table of contents (menu) and an alphabetical index. It may also include a glossary. And it may include a search facility.

**Example: Designing Knowledge Products**

The course *Designing Knowledge Products* uses a book structure.

Built using Adobe Dreamweaver and Active Server Pages.

Originally created in 1996, it organized instructions on producing electronic courses and documents as an electronic document. The book structure was appropriate because it was familiar to designers who would be designing online documents and because it illustrated a strategy they might want to emulate for their Web sites and online documents.
Looking at the first page, you can see the table of contents to the left.

Clicking the **Index** link displays the alphabetical index. Clicking on a letter at the top of the panel scrolls the index to entries beginning with that letter.

Clicking the **Glossary** link displays a glossary window. There the learner can type in a term to look up the definition of that term or can click a letter button to scroll to glossary entries beginning with that letter.

Built using Adobe Dreamweaver and Active Server Pages.

Clicking the **Search** link lets the learner search the course for specific topics.

Built using Adobe Dreamweaver and Active Server Pages.
When to use the book structure

When should we use the book structure? This structure works well for large, complex subjects with a well-understood organization. The hierarchical structure accommodates a large number of topics, making them accessible and revealing interrelationships among them. If content can fit into a hierarchical organization, the book structure is a good choice.

Use the book structure for just-in-time learning when finding pieces of knowledge is critical. Because content is logically and clearly organized, learners can reliably find individual topics when needed. The table of contents, index, and search facility simplify finding topics quickly.

Best practices for book structures

A book is not a course. The book structure is a good metaphor, but it takes careful design to make it seem natural for e-learning.

Organize content logically. The more logical the organization, the better learners can find individual topics. The most logical organization is the one expected by learners. If learners find the organization familiar, they can anticipate the location of specific topics. If learners do not have a consistent expectation of how the content is organized, then organize the lesson as suggested by experts in the field. That way the structure teaches learners to think as experts.

Do not overdo the book metaphor. Forward navigation does not require a hand to pull the page across the screen. You do not have to use a parchment background for displays. Displays need not be shaped as pages of a book. Adapt the structure of the book; do not mimic its minor details.

Index, index, index. Although indexing is hard work, it does make the content accessible to learners not yet familiar with the official terminology of the subject.

Enable drill-down navigation. Title topics clearly and list subtopics so that learners can select ever-more-specific topics until they get to a single topic that teaches what they want to learn.

Create self-contained topics. Learners do not always read from the start of the book. They may jump to a topic from the table of contents, index, or search facility. This means each topic must be self-contained. Chapter 6 on topics can help you do that.
Scenario-centered lessons

Some multifaceted learning activities are almost lessons in themselves. Almost. To turn them into lessons you must wrap them in a context and integrate them into your overall course structure. One way to do this is to design multiple activities that explore different aspects of a single, rich scenario to reveal different perspectives and to accomplish multiple objectives.

Architecture of scenario-centered lessons

The scenario-centered structure organizes learning around a main scenario. The scenario consists of an important and difficult task or problem. The scenario usually contains an ongoing example upon which individual topics or activities focus. In the scenario-centered lesson, low-level learning objectives are not taught by independent topics. Instead, they are accomplished together in the overall process of meeting the challenge posed by the ongoing scenario. For example:

In the center is a complex problem or an ongoing example. After a brief introduction, the learner prepares for the activity. The scenario may occasion reading and research activities. All of the research and reading relates to issues raised in the scenario. For example, learners may have to research a solution to an obstacle in the scenario. They may have discussions about issues raised in the scenario. These discussions may involve ideas uncovered by research. The discussions may occasion more research. Group activities, such as brainstorming and role playing, may elaborate aspects of the scenario. Questions may be posed to learners about situations revealed in the
scenario. **Live presentations** may be conducted to provide conceptual knowledge needed for the scenario or to discuss aspects of the scenario. **Individual practice activities** may require learners to make judgments and decisions relating to the scenario.

Because all the activities depend on the scenario and their goals are interdependent, it may be hard to make the individual activities into objects. It may make more sense to make the entire lesson into an object.

**Example: Economics of learning**

I taught an online seminar on economics of learning. It featured some pretty boring spreadsheets and formulas for calculating return on investment. Participation zoomed when I introduced a cast of imaginary characters and a crisis involving the characters.

I started with a hero to care about. I put the hero in difficult circumstances to win sympathy and arouse a desire to help the hero on her quest for redemption.

The hero had a nemesis—not exactly a villain but certainly a challenge. The nemesis presented the learner with a predicament to overcome. The predicament called for immediate action.
To add interest, I gave the hero allies who provided advice and information that might otherwise appear in dry commentary. The idea of the scenario was to tell the story through the experiences and actions of people.

The hero had her moment of crisis and discovery.

I ensured that all actions took place in the context of helping the hero deal with the crisis. Abstract principles and formulas were presented as they applied to the situation faced by the hero.

In the end, the hero—with the learner’s help—triumphed. The learner shared emotionally in that triumph.
By centering all the activities of the seminar on one woman’s quest, the seminar gave personal meaning to some pretty dry subject matter.

**Example: Graduate management course**

Here is an example of a scenario-centered course. The course is titled *Managing the Design, Development, Delivery, and Evaluation of e-Learning*. It is a graduate course in the master's of education degree program by Jones International University. In this course, the learner plays the role of the newly hired chief learning officer of a fictitious company. The centerpiece of this course is a single activity.

Learners are introduced to this activity in a welcome e-mail at the beginning of the course. The central activity requires the learner to craft a proposal for implementing e-learning at a fictitious company.

All other activities are in the context of this simulated company. Assignments stem from a to-do list rather than a formal syllabus. All items contribute to the overall goal. Tasks include drafting sections of the proposal as well as dealing with weekly crises, such as calming a nervous employee or revising an annual budget.
Likewise, weekly reading assignments relate to issues raised on the to-do list. Reference materials include a simulated corporate Web site, a previous version of the proposal, and various books and papers.

Online discussions with fellow learners take place in the format of online meetings of a professional association to which learners all belong. Each week’s topic of discussion concerns an important issue or problem in the ongoing scenario.
Questions asked of the instructor must be phrased as requests to the learner's boss in the simulation. Everything the learner experiences in this 8-week course relates directly or indirectly to the task of drafting the proposal.

**When to use scenario-centered lessons**

Use a scenario-centered lesson for complex concepts, emotional subjects, or subtle knowledge best taught by engaging learners in rich interaction. Use this structure for objectives that cannot be accomplished with a single large activity or a series of simple independent activities.

The scenario-centered structure works well for teaching subjects when the correct answer is based on conflicting needs and contradictory information, that is, when judgment is required. Because this structure exposes the learner to multiple perspectives and includes different formats of interaction, it builds a complete understanding of a complex situation.

This structure is also good to add continuity to the learning experience. And because it centers on a real situation, it provides context for abstract concepts and principles.

**Variations on the scenario-centered lesson**

The scenario-centered lesson structure is as varied as the activities on which it is centered. Here are some variations you might try:

**Link to alternative materials.** One common variation is to link to other learning and reference materials on the subject of the lesson. Include these links in the Introduction, Preparation, or Summary.

**Add a practice session.** If the activity is not truly interactive, you may want to graft on a practice activity so that learners get a chance to practice what they have learned.
**Test by other means.** Resist the urge to include a formal test of knowledge. Instead use a relevant activity, such as some kind of work product, to confirm that learners have mastered material taught in the lesson.

**Include secondary scenarios.** If your course teaches a complex activity, you may want to include some secondary scenarios that deal with special issues or problems. You can design your main scenario so that the secondary scenarios appear a natural part of the overall scenario.

**Best practices for scenario-centered lessons**

Pay attention to the quality of the core scenario. It is the heart of the lesson. Test its effectiveness with actual learners before you add the other components of the lesson. Do learners readily understand the task or problem—and do they care about its resolution?

Prepare learners. Provide everything necessary for learners to engage the scenario, for example:

- **Goals of the scenario.** What do the people in the scenario hope to accomplish? And what are the learning goals?
- **Context.** How does the scenario fit into the course as a whole?
- **Prerequisites.** What learners must know before beginning the lesson.
- **Rules of behavior.** What can learners do and not do in the lesson? How do learners interact with the instructor and fellow learners?
- **Instructions.** What tasks must be performed and what documents created? What are the deadlines?
- **Additional resources.** Include links to needed information, software, or other resources.

Explain the scenario. Unless learners understand the scenario, they may miss the points it is designed to make and may misconstrue the principles it is meant to illustrate. Explain what information is available about the scenario so that learners know how to fully understand the scenario. Tell learners what assumptions they must make. If the scenario is not completely realistic, explain its limits and ask learners to work within these limits or to use their imagination as to what lies beyond the limits of what is provided.
Monitor discussions and other activities to keep learners on track. It is easy for learners to misinterpret some aspect of the scenario or become fixated on some minor detail. Do not censor or interrupt discussions, but do gently nudge conversations back to the heart of the matter.

Tell learners how to ask questions and get help. Can they get help within the framework of the scenario, for example, by e-mailing one of the characters in the scenario? Or must they address questions to an external Help desk or facilitator? Be clear on the type of support provided and the mechanism for requesting assistance.

Essential-learning tutorials

There is nothing harder or more wasteful than trying to teach people something they already know. In the essential-learning tutorial, learners skip topics they do not need to learn. The essential-learning tutorial targets missing knowledge and skills. In the essential-learning tutorial, learners dive into the lesson at their thresholds of ignorance and proceed to the end, or until they satisfy their needs.

Architecture of essential-learning tutorials

The essential-learning tutorial is organized to enable learners to skip topics they have already mastered. The exact organization may vary, but the idea is to use testing to identify what learners already know and therefore do not need to learn.

Here’s how an essential-learning tutorial might be organized. After an introduction, learners begin a gauntlet of tests. The tests are progressively more difficult. That is, each one assesses more advanced levels of knowledge or skills than those before. Learners continue down the test series until they fail to pass a test. At that point, they are directed into a parallel sequence of content topics. Thus learners enter the sequence at the upper limit of their abilities.
For example, a learner would not begin with Topic 1 but with a test on the objective of Topic 1. If the learner fails the test, the learner is enrolled in Topic 1. If the learner passes the test, the learner progresses to a test on the objective of Topic 2. Failing this test enrolls the learner in Topic 2. And so it goes, with the learner progressing through a series of tests, each covering the objective of a topic in the sequence. Failing a test shunts the learner into a sequence of topics. After completing the sequence and demonstrating mastery of the material, the learner can continue with the next sequence of topics or return to the series of tests. This way, the learner bypasses material already understood.

The topics in an essential-learning tutorial can be learning objects. And the tests can come from those already defined as part of the corresponding learning object.

**Example: Visual Basic tutorial**

Here is an example of an essential-learning tutorial. It teaches Visual Basic programming skills.

It starts with a test. If the learner scores below a minimum score, 135 in this case, the test suggests that the learner review the module covering the subject of the test. Otherwise the learner is advised to continue with the next test in the series.

At the end of the test, the learner clicks the **Evaluate** button to receive a score on the test.
The score card reveals the test results. Here the learner scored 125 out of a possible 150. The numeric value of the score indicates how well the learner understands the material.

Because the learner scored less than the score required to skip the module, the learner is directed to the topic on the subject of the test.

In this example, the learner can choose to ignore the advice and continue with the testing sequence, take the module, or quit altogether. Some other variants of the essential-learning tutorial do not give the learner this choice.
Example: Coach-me simulations

Coach-me simulations have learners attempt the simulated task on their own. Learners receive hints or explicit directions only if needed.

This diagram shows the common structure for each step in a simulated task. (You may remember this diagram from Chapter 7 on games and simulations.) At the beginning of the step, the learner views a simulated computer screen, but receives no prompting. If the learner then makes the correct response, the simulation reveals the results and a brief confirmation of the correctness of the response. The learner then continues with the next step in the procedure.

A learner who needs a bit of help can click a Hint button to get a suggestion for what to do. The suggestion does not reveal exactly what to do, but does guide the learner toward the solution. A correct response then puts the learner back on track.

If the hint is not sufficient, the learner can click the Show how button to get complete instructions on where to click and what to type. Once the learner follows the directions, the simulation continues.
In this architecture, the learner does not have to request a hint before receiving explicit instructions. The learner can always click the Show how button to receive explicit directions. The learner can also skip to the next step by pressing the Next button.

Learners proceed step-by-step through the simulated procedure until they encounter a step they cannot perform. Then they get help by asking for a hint, asking for explicit instructions, or by attempting the step and getting feedback.

For instructions on designing coach-me simulations, see Chapter 7.

### When to use the essential-learning tutorial

Use essential-learning tutorials to reduce the time spent learning a complex, varied subject. For such subjects, it is difficult to predict what aspects of the subject an individual learner knows already. By using this structure, you can match learning precisely to the needs of the individual.

Likewise, use the essential-learning tutorial to efficiently educate people from widely varying backgrounds. With a wide variety of learners, it is not practical to make everyone start at the level of the least knowledgeable learner and proceed to the goals of the most ambitious learner. Often, learners are too impatient to endure training on subjects they have already mastered. This structure lets advanced learners skip the parts that are too basic for their needs.

### Variations on the essential-learning tutorial

The essential-learning tutorial is a simple structure that you can easily adapt to your needs. Here are a few variations you may want to consider:

**Let learners quit as soon as they meet their goals.** This structure lets learners dive in at the level of knowledge they possess. You can also let them jump out when they reach the level they desire. Let learners know that they can quit the lesson when they feel they have learned all they need.

**Return to the test stream.** If it is not so easy to tell what knowledge is basic and what is advanced, you can simply return learners to the test stream once they complete a content topic. It is probably best to return them to another version of the test they failed so they can confirm that they have indeed learned the material.
**Generate lessons.** Generated lessons tailor a lesson to each learner based on answers to a test or questionnaire presented at the start of the lesson.

![Diagram of lesson generation process]

After a brief introduction, the learner takes a test or fills in a questionnaire. The test analyzes the learner’s answers and threads a sequence of topics that exactly meets the needs of the individual learner. The lesson concludes with a summary and test.

**Best practices for essential-learning tutorials**

- **Validate your tests.** Unless your tests accurately measure the learner’s current knowledge, they will be ineffective in directing the learner to needed topics.

- **Make the test gauntlet more sophisticated.** Use a more flexible and sensitive testing scheme. Give learners a graduated series of problems to solve. Each time learners get a question right, they skip ahead five questions. If they get one wrong, they go ahead to the next question. If they get three questions in a row wrong, they go directly to a topic at that level of difficulty.

- **Vary the kinds of tests.** The test sequence can contain more than traditional true/false, multiple-choice, and short-answer questions. You can use any self- or computer-scored activity to decide where learners should jump into the content path. No one likes taking a long series of tests, so add variety with different types of questions, and throw in some games, too.

- **Focus each topic on a single learning objective.** That way testing can precisely pinpoint the learner’s needs and provide just the modules to meet those needs. Make each topic a distinct learning object.
Monitor usage and feedback to refine the tutorial. Look for modules that everybody bypasses. Are they really needed? Or are the tests for those topics too easy? Look for complaints from learners that they are taking topics that they already know. Perhaps the tests for these topics are too hard. Keep refining tests and topics until learning is highly efficient.

Exploratory tutorials

In an exploratory tutorial, learners discover knowledge on their own. They are given goals and an electronic collection of knowledge, which they must explore in order to achieve these goals. Learners may be given navigating tools to help in the task.

The exploratory tutorial is an extended version of the scavenger-hunt and guided-research activities (Chapter 4).

Architecture of exploratory tutorials

The exploratory tutorial consists of two parts. One part is an external source of information. Typically this is an online knowledge product that existed before you created the tutorial. The external information source may be any type of information source that can be accessed online. It may be an electronic document, such as a manual, report, or specification. It could also be a database, a Help file for a computer program, a Web site, or even an online museum. In special cases, an exploratory tutorial can include social media, such as archived blog postings and podcasts, as well as active online discussions like those that support a community of practice. The tutorial leverages the external information source to produce education or training.
The exploratory tutorial itself might begin with an **introduction** that provides an overview of the tutorial and previews its contents. From the introduction, learners can access several kinds of activities and resources.

One essential activity is an **assignment** that causes learners to interact with the external information source. Typically it will require the learner to look up information in the external information source. To accomplish multiple objectives, the exploratory tutorial poses questions that together cover the objective. Questions are sequenced to reveal prerequisites first and to proceed from simpler questions to more difficult ones.

Because the external information source is vast and may cover more subjects than the ones relevant to the tutorial, the exploratory tutorial may include a **summary** of the subject. This summary would cover just enough of the subject to meet the tutorial’s objectives. Think of it as backup or learning insurance.

To verify accomplishment of objectives, the tutorial may include a simple **test**. Completion of the assignment should provide adequate preparation for the test. The test may be “open book,” meaning that the external information source may be searched for answers to help complete the test.

One final topic is a special **index** that helps learners locate relevant topics in the external information source. Entries in the index link to specific pages or topics in the external information source. A simple form of an index is just a page containing links to different relevant Web pages.

You may create several exploratory tutorials for a single external information source, each emphasizing a different aspect of the subject or covering how to perform a different task.

Exploratory tutorials are not made up of lower-level objects because each objective is taught not by the tutorial but by interaction with an external information source.

**Example: Text-components catalog**

The *Designing Knowledge Products* course includes an exploratory tutorial teaching how to design paragraphs, bullet lists, checklists, and other pieces of text in Web pages and other online documents.
The Text-components lesson shown here illustrates the exploratory-tutorial structure.

Built using Adobe Dreamweaver, Active Server Pages, and custom JavaScript.

Learners are told to complete an assignment using an external text component catalog. The assignment is a scavenger hunt that requires the learner both to find the answers to specific questions and to identify the row and column (within the catalog) where the answer is found.
In the catalog, information is organized in a two-dimensional grid of three columns by eight rows. The three columns link to topics about each type of text component, namely what the component is, when to use it, and design issues when creating one of these components. The components themselves are organized into rows. They include bullet items, checklists, glossary items, indented lists, numbered lists, paragraphs, tables, and titles and headlines.

For example, selecting “What is a …” and “Checklist” from the dropdown lists displays the topic explaining what checklists are, the first topic of the second row. Its location in the information source is indicated by the green rectangle in the dark-blue grid at the upper right.

Built using Adobe Dreamweaver and custom JavaScript. View example at horton.com/eld/.
After completing the assignment, learners take a quiz to verify their understanding of the essential content from the information source.

Finally, learners read a short summary before continuing with the course.

When to use exploratory tutorials

Use exploratory tutorials for:

**Teaching how to learn.** Exploratory tutorials accomplish learning objectives that involve learning to learn rather than learning specific facts, procedures, or concepts. Although specific questions may be used to guide the exploration, the learning goal is the ability to find and acquire new information rather than the answers to specific questions.

**Teaching how to navigate online information.** Exploratory tutorials teach how to use a large, complex source of online information. The exploratory tutorial both motivates and guides productive searching and reading activities. It prepares learners to search on their own.
Teaching searching skills. The exploratory tutorial teaches searching strategies that learners can employ to learn on their own. It shows them how to use an external information source for just-in-time learning. Such search skills will transfer to Web searches as well.

Saving time and money. Exploratory tutorials are inexpensive and quick to develop, as they leverage existing materials. They also fit well with learners adept at searching the Web to find answers to everyday questions.

But not for novices. Exploratory learning is best for experienced learners who are comfortable navigating Web documents and who already understand the basics of the field of study.

And not for teaching a large subject. The exploratory tutorial is not effective to teach extensive content from the external information source. The information source is vast and the exploratory tutorial requires considerable work by learners to find information. Although the exploratory tutorial can teach focused aspects of the subject, it is not a good way to cover a large subject.

Variations on the exploratory tutorial

Many variations are possible based on the documents being explored and on the style of interaction.

Vary the information source that the learner must explore. Some candidates for exploration include Web sites, blogs, podcasts, reports, white papers, specifications, brochures, manuals, e-books, databases, newsgroups, discussion forums, chat archives, and Help files.

Mix static documents with active discussions. Prompt learners to get knowledge from both information sources and social networks. Encourage them to harvest ideas documents and to test and refine them in online discussions.

Vary the organization of the information the learner must explore. If you have control over the organization of the external reference documents you use, vary their structure based on the type of information they convey. A sequential structure is good for online versions of paper books. Many online documents can be organized as a hierarchy of topics and subtopics. Tabular information will fit well into a grid. Loose collections of data can be linked in a free-form structure.
Vary the tone of the activity. Several years ago, a popular computer game, Where in the World Is Carmen Sandiego?, required players to look up information in an included paper reference book in order to track down the elusive international criminal. That is exactly the same task as in this lesson structure. All of which suggests making this structure into a game or puzzle.

**Best practices for exploratory tutorials**

Exploratory tutorials must ensure that learners search and learn successfully.

Make finding information fun, like a game. Challenge learners to find the information needed to solve a problem or complete a scenario. Start with some easy questions and, as search skills develop, pose more challenging questions.

Explain the structure of the information source so learners can quickly understand how to navigate it. Such knowledge will make their searches more predictable and hence more reliable.

Suggest search strategies as appropriate. If learners are new to information searching or are unfamiliar with the information source, you may want to suggest ways to make initial searches more productive and less frustrating. For example, you may want to point out that an online document has an alphabetical index or recommend drilling down through menus.

Balance challenge and difficulty. Ask enough questions to accomplish your objectives but not so many that the lesson becomes tedious and repetitive. Three questions hardly justify a lesson; 20 questions become an inquisition. Make questions hard enough that learners must search to find the answers and easy enough that most learners can do so within a few minutes.

**Subject-specific structures**

The subject-specific structure is the most flexible. Use it when the subject or activity provides its own distinct structure to organize learning. It is sometimes called a network or free-form structure because it imposes no restrictions on the organization beyond those implied by the subject matter.
When to use a subject-specific structure

Use the subject-specific structure when more defined structures do not represent the structure of the subject or the navigational pathways needed through the subject. Use it to organize learning to match the underlying structure of knowledge, a work activity, or a complex process. Use it for:

- Scenes in a branching simulation.
- Multi-faceted subjects that learners can explore to satisfy their interests.
- Learners with different interests and goals. Creating many custom courses is not practical.
- Highly customized learning experiences.

And use it when no other structure works.

Example: The Crimescene Game

*The Crimescene Game* (Chapter 7) is a branching simulation. As such, it provides the learner with great freedom of navigation among the topics or scenes of the simulation. Here is a map of all the scenes. Learners encounter scenes in response to decisions they make. The oval with an A inside signifies the main menu of questions, or lines of inquiry. Learners return to this menu when they exhaust a particular sequence of scenes or pathway.
Best practices for subject-specific structures

- Test the structure to ensure that learners can successfully navigate it.
- Limit the complexity of the structure. See Chapter 7 for tips on managing the “combinatorial explosion” that often results from freeform branching structures.
- Consider additional navigation mechanisms to ensure everybody finds what they need. See online Chapter 15 for some suggestions.

DESIGNING LESSONS AS LEARNING OBJECTS

Lessons can be designed as learning objects … or not. They can be composed of lower-level topic-sized learning objects … or not.

Lessons as objects

Lesson objects completely accomplish a broad learning objective or a tight cluster of related objectives. They can be self-contained or can be composed of lower-level topic objects. Either type of lesson object can be reused.
Lesson-level learning objects are more complex than topics. They include topics as content and may require multiple pages to display. Here is a schematic view of such a lesson-level learning object.

![Diagram of lesson object]

The learner might start at the home page of the object. There the consumer would see the title of the object, a location indicator, and an introduction or overview.

From this page, the learner might jump through the topics that contain the actual content of the object. These may represent lower-level learning objects.

After experiencing the content, the learner may be directed to a test. The test may contain multiple exercises or test questions to assess understanding of the content or the ability to integrate what was learned in the individual lower-level learning objects.

Following the practice may be a summary page to recap the main content of the object.

The home page may contain a link to display a list of related resources.

The menu entry for the current learning object may appear in a separately displayed menu. Clicking on this entry would display the home page for the learning object.
When to divide a lesson into objects

It would be wasteful to divide one complex, multi-faceted activity used to accomplish multiple objectives into separate lesson objects—one for each learning objective. Doing so would require that the whole activity be included in each lesson object. And taking these repetitive lessons would be tedious for learners.

However, if a broad goal is easily subdivided into lower-level component or prerequisite objectives, it makes sense to develop objects for those objectives and then aggregate them to compose higher-level lessons—especially if the lower-level topic objects may be combined differently to meet other broad goals or for different groups of learners.

Composing lessons of objects

To design a lesson composed of smaller learning objects.

1. Identify the lesson’s sub-objectives, or prerequisites, as in Chapter 1.
2. Identify or create topic-level learning objects to accomplish these objectives. See Chapter 6 for instructions.
3. Sequence these objects so they best accomplish the overall objective of the lesson.
4. Provide additional higher-level activities and tests to accomplish and verify the lesson’s higher-level objective.

Think about reuse, but not too much. Focus on making a lesson that works.

IN CLOSING ...

Summary

- Lessons consist of sequences of logically linked topics that together create rich learning experiences.
- The classic tutorial structure is the most common, safest, and least efficient of common lesson structures.
- Other structures customize learning paths to meet the needs of learners.
- Orderly, predictable organizations outperform chaotic, mysterious ones.
To organize lessons and courses, analyze dependencies among concepts and the learner’s current level of knowledge.

Instead of sequential structures, consider layered ones, especially for self-guided, as-needed learning.

For more ...

Consider the components of lessons, namely topics (Chapter 6), learning activities (Chapters 2, 3, and 4), and tests (Chapter 5).

Some kinds of learning activities readily scale up to handle more complex objectives. They can serve as the core of an entire lesson. Good candidates include scavenger hunts, research, field trips, case studies, virtual laboratories, and role-playing scenarios.