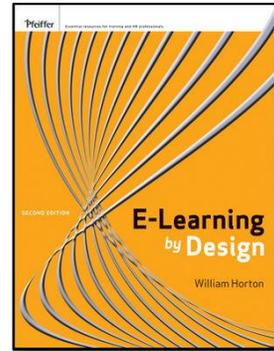


14 Visual display



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

By
William Horton

William
Horton
Consulting



838 Spruce Street
Boulder, CO
80302-5022 USA
+1.303.545.6964
william@horton.com
www.horton.com

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Visual display

Designing the appearance of your e-learning

E-learning communicates visually. Yet visual design is often ignored or treated as a minor cosmetic detail. Frequently e-learning content is just dropped into the default template provided by an authoring tool.

Learners generally do not notice good visual design. You don't get e-mail messages praising the legibility of text or the precise visual hierarchy of your displays. Visual design is only noticed if learners cannot find critical material or cannot figure out how to navigate the course. Or they cannot read without excessive eyestrain. Or critical information is out of sight when needed. Or they must continually uncover windows or scroll back and forth. Good visual design is about solving problems, not drawing attention.

FUNDAMENTAL DESIGN DECISIONS

To design the display of e-learning, you must make some fundamental design decisions. Although you may develop preferences for particular approaches and styles, these decisions depend very much on the nature of your individual project.

- ▶ **Whole screen or window?** One of the first decisions is whether your e-learning will cover the entire screen or appear within a window on the screen.
- ▶ **Number of windows.** Will everything display in one window, or will a number of separate windows be required?

- ▶ **Window characteristics.** What is the size and shape of windows used by your e-learning? Will content scroll or stretch to fit the window?
- ▶ **Legibility of content.** How will you ensure that learners can easily read text and interpret graphics? What color or graphic will you use for a background? What font, size, color, and style will you use for text?
- ▶ **Layout.** How will you arrange items to fit within the display?
- ▶ **Unity.** How will you make the whole course visually coherent? Here is where aesthetics can be applied to good purpose.

In this chapter, we will consider each of these decisions in turn. Keep in mind that they are all related. You may want to revisit earlier decisions as you make later ones.

WHOLE SCREEN OR WINDOW?

Should you display your e-learning over the whole screen or in a window? That is, does your e-learning take over the entire display space, or leave some of it available for other purposes? For many mobile devices, your e-learning covers the entire screen—you have no choice. However, for desktop or laptop computers, let's consider where you would use each approach.

Full-screen course

Displaying over the entire screen gives the maximum display area possible for the course.

The screenshot shows a web-based Gantt chart interface. On the left is a navigation menu for 'the Gantt Group' with a list of topics: 'The framework', 'Task bars' (highlighted), 'Dependency links', 'Float', 'Milestones', and 'Practice'. The main content area is titled 'Task bars' and contains a Gantt chart with 26 weeks on the x-axis and tasks A through J on the y-axis. Task A starts at week 1 and ends at week 5. Task B starts at week 5 and ends at week 10. Task C starts at week 10 and ends at week 15. Task D starts at week 15 and ends at week 20. Task E starts at week 1 and ends at week 3. Task F starts at week 3 and ends at week 7. Task G starts at week 3 and ends at week 5. Task H starts at week 7 and ends at week 11. Task I starts at week 7 and ends at week 11. Task J starts at week 11 and ends at week 13. Arrows indicate dependencies between tasks. Below the chart are controls for 'Narration text', 'Restart', 'Previous', 'Stop', and 'Play'. At the bottom, there is a footer with contact information for the Gantt Group and a navigation bar with 'Index', 'Contact us', 'Need help?', and 'Search'.

Here is an example of a course displayed over the entire 800 by 600 screen. It minimizes distractions and limits access to other programs.

Built using Adobe Dreamweaver, custom JavaScript, and Flash. View example at horton.com/eld/.

Use the entire screen for novice computer users, who may be confused or distracted by multiple windows and irrelevant icons. Also use a whole-screen display for people who are easily distracted, such as children and instant-messaging addicts. Displaying over the whole screen can discourage (but not prevent) cheating by making it more difficult to consult other online resources.

Course in a window

Displaying the course in a separate, floating window allows learners to attend to other things on the screen.

Here is the same course displayed within a window. It does not cover the entire screen. Other windows can be seen on the same screen. One displays the transcript for the animation shown in the main window. Another contains notes taken by the learner. Also visible and accessible are icons to open other files and start other programs.

The screenshot shows a Windows desktop environment. In the foreground, there is a window titled "Interpreting Gantt Charts - Microsoft Internet Explorer". The window displays a Gantt chart with tasks A through J and a timeline from Week 1 to Week 25. The chart shows task A starting at Week 1 and ending at Week 5. Task B starts at Week 4 and ends at Week 10. Task C starts at Week 11 and ends at Week 18. Task D starts at Week 18 and ends at Week 25. Task E starts at Week 1 and ends at Week 2. Task F starts at Week 2 and ends at Week 8. Task G starts at Week 2 and ends at Week 4. Task H starts at Week 4 and ends at Week 10. Task I starts at Week 11 and ends at Week 18. Task J starts at Week 18 and ends at Week 25. The window also includes a navigation bar with buttons for "Restart", "Previous", "Stop", and "Play".

Overlaid on the bottom-left of the Gantt chart window is a transcript window titled "Task bars - Microsoft Internet Explorer". The transcript contains the following text:

Select a topic below:

- The framework
- **Task bar**
- Dependency links
- Float
- Milestones
- Practice

The most significant parts are the task bars.

The task bars are those rectangles that show when tasks begin and end.

Let's look at how task bars show the length of activities.

On a Gantt chart time flow, a bar is present over the duration of a task being performed.

Let's look at what an individual task looks like.

Notice the third bar from the top shows the length of Task C because it is in the same row as Task C at the left. From the task bar, we can see that it starts at Week 11. From the task bar, we can see that it ends at the end of Week 18. Measuring the length of the bar,

At the bottom of the transcript window, there is contact information for "the Gantt Group":

323 North First St., Suite F
Ann Arbor, MI 48105
41.734.769.6700 phone
info@ganttgroup.com

In the background, a Notepad window titled "ganttChartNotes.txt - Notepad" is open, showing the text "Parts of a chart:". Other desktop icons include Recycle Bin, My Network Places, and various shortcuts.

Now, when would you display e-learning in a floating window? One good reason to do so is to enable multitasking, that is, to let the learner switch back and forth among different tasks on the computer. You might, for example, want learners to make notes, or learners might need to answer e-mail messages.

You might also use a floating window to enable learners to work with separate programs. If you are teaching use of a computer program, you may want learners to immediately apply new skills in the computer program.

Another reason for a window display is so that learners can consult other materials. These materials may be optional reading materials that are part of the course or original research that learners conduct on the Web.

Keep in mind, however, that some tablets and smartphones provide only full-screen display—separate windows are not an option.

Consider related decisions

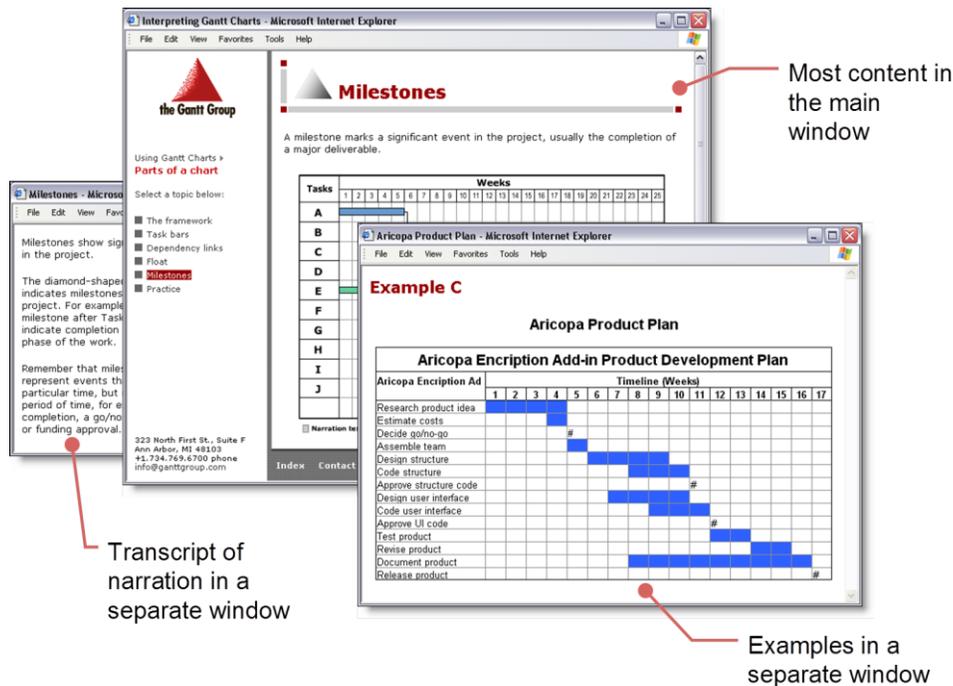
If you cover the screen, you must know the display size or at least the minimum display size among your learners. And you must design everything to fit that size. You may also want to allow some secondary windows on top of your screen-hogging main window. This, however, can defeat the purposes for which you chose to cover the screen. If you go with a floating window, you must decide its size and other characteristics. Thus, each decision you make will affect others.

NUMBER OF WINDOWS

Another critical design decision is the number of windows to use in your e-learning.

Use separate windows sparingly

Most e-learning uses separate windows sparingly. Here is an example that illustrates that trend. The primary window is divided into two areas: the menu on the left and the content area on the right. Within each of these two areas are secondary areas, navigation buttons, titles, and other minor items. This one window contains most of the content of the course.



There were few exceptions. One was for the text transcript of voice narration. A second was for examples that were the subject of practice activities. These appeared in their own windows so they were not confused with the main content of the course itself.

As a designer, you must decide when to violate the one-window policy. You will need a consistent rule about when to display content in a window separate from the main display.

When to display in the same window

When should you display all your course content in the same window? Displaying all content in a single window minimizes the distractions caused by windows popping up in the learner's field of view. Displaying content in this main window lets you control that display. Learners cannot resize, reshape, or move content.

Another time to display everything in one window is when you cannot disable learners' pop-up blockers. Pop-up blockers prevent Web browsers from displaying additional windows. Pop-up blockers are commonly used to prevent the display of advertisements from Web sites. If your learners have pop-up blockers enabled, you must either instruct them to turn off the pop-up blockers while taking your course or you must avoid displaying additional windows. Keep in mind that some learners may not know how to turn off their pop-up blockers, especially if someone else set them up.

Displaying in a single window is helpful during a test to ensure that learners cannot view other parts of the course while answering the test questions. Although displaying everything in one window cannot prevent a clever learner from accessing related information, it can make it clear that such access is not approved.

When to display a new window

When should you display content in a separate window? Let's consider some conditions under which it is appropriate to launch a new window in the middle of a course.

You may need a new window for material that requires a larger or differently shaped window. One place where this occurs is when you need to launch a simulation to teach someone to use a computer program that itself needs most of the screen space. The simulation may require more space than is available within your course window.

Another use for a separate window is for a graphic or other material learners must refer to repeatedly. Putting the material in the main window could cause it to scroll out of view or get replaced as new content is introduced. Separate windows allow learners to make side-by-side comparisons of separate pieces of content in the way most convenient for them.

There are also technical reasons for using a separate window. Sometimes material uses a frameset to format the display or contains scripts for interactivity. Sometimes these framesets or scripts will not work correctly unless the content appears in its own independent window.

You will also need a separate window to display material owned by someone else whose terms of usage require a separate window. Copyright owners often require independent displays to make clear that their content is from a separate source and is not an integral part of your course. Putting the content in the main window could create the impression that you own or endorse the content displayed.

WINDOW CHARACTERISTICS

When we display e-learning, we must be concerned with the characteristics of the windows where the e-learning appears. We must carefully specify the size, shape, and configuration of the windows. Start with your main window and then consider any secondary windows you need.

Window size

One of the first decisions we need to make is the target window size. That is, how large should you make your display window?

Calculate your window size

To specify your window size, you need a systematic process. That process must account for constraints you face and requirements that your e-learning must meet.

Calculate the maximum size

Start by calculating the maximum size you can make the window for your e-learning.

$$\text{Maximum window size} = \text{Monitor size} - \text{Space for other programs}$$

First, consider the size of the smallest monitor or device screen you will target. This size provides an absolute upper limit on the size of your e-learning window. How many pixels vertically and horizontally does it display? For example, the monitor may display 1024 by 768 pixels, meaning it displays 1024 columns of pixels by 768 rows of pixels. Remember, it is the dimension in pixels, not the linear size that is important here. A 30-cm monitor may display more than a 35-cm monitor.

Next you must consider the space required for other programs that must be visible at the same time as your e-learning window. These might include a task bar for switching to other programs and an instant messaging window. It might also include a Notepad window for taking notes or another Web browser window for conducting research or viewing examples.

Once you subtract the space required for other programs from the size of the monitor you have the space available for your e-learning. This gives you a maximum size for your window.

Calculate minimum size

The next step is to calculate the smallest size you can make the window displaying your e-learning.

$$\text{Minimum window size} = \text{Space for content} + \text{Space for navigation} + \text{Space for identification} + \text{Window chrome}$$

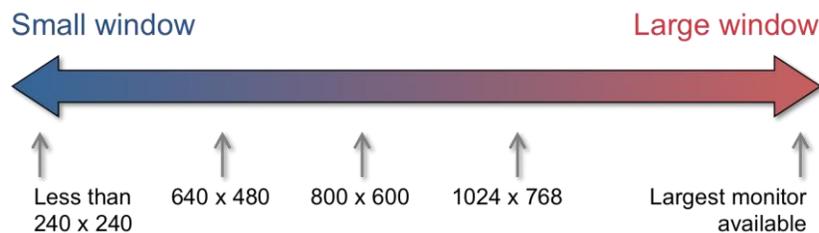
Start with the minimum content you must display at once. What is the smallest area of content before the content becomes confusing? To this, you need to add area for course navigation, such as navigation buttons and a menu of topics. Next, you need to

add areas for course identification, such as the logo of the course sponsor or a contact address. Finally, you need to add area for window “chrome,” such as a window title, window menus, scroll bar, and status area. Adding up all these areas gives you your minimum window size.

If your minimum window size is larger than the space available, you have some hard compromises to make. At least you know about these requirements before you design your e-learning and its media.

Small or large window?

Do you design for a small or a large window? What are the tradeoffs and constraints of this choice? Let's consider a range from a small window to a large window. At the small end of the scale we might have a window less than 240 by 240 pixels. Along the scale, we might have displays of 800 by 600 pixels, 1024 by 768 pixels, or larger.



Designing for a smaller display means that more learners will be able to display our e-learning and to take it without extensive scrolling. Courses designed for a small window can be deployed more widely, without undue concern for the size of learners' monitors. You do not need to worry whether learners take the course on a desktop computer or a laptop or whether learners take it on work or home computers. A small window leaves space so learners can see other windows while taking e-learning, making it easier to consult reference materials, take notes, and perform other tasks.

In a large window, you can make text more legible. And you do not have to squeeze text. You can enlarge graphics so small details show clearly. Because more content can fit in the main display, you will need fewer separate windows that can startle learners and trigger pop-up blockers. Large windows allow a more sophisticated layout. You can permanently display a table of contents to enable rapid and fluid navigation. You can put related graphics side by side and use large tables where needed.

Design for the future

In selecting your window size, consider where you will display learning in the future. During the life of your e-learning, display sizes may change. Display technologies and display devices are evolving. Large high-resolution monitors are dropping in cost and small-screen mobile devices are becoming more common, as is the desire to move to mobile learning. Let's look at some places where e-learning is being displayed in the present time and where even more e-learning will need to appear soon. On the next image, devices are scaled to a consistent pixel size so you can see the relative amount of information each device can display.



A desktop computer can have a monitor displaying many times what a similar computer did just a few years ago. For example, Apple's HD Cinema screen can display up to 2580 pixels by 1600 pixels. A modern laptop computer can display 1400 by 1280 pixels. Tablet computers typically display on a screen 768 by 1024 pixels. Tablet and smartphone displays can be portrait or landscape orientation. Current smart phones have displays of 320 by 480 pixels or so.

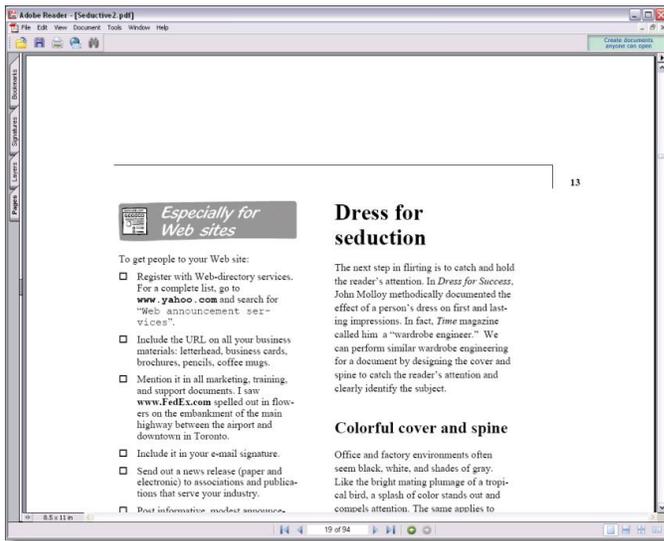
Before you design for one screen size, consider whether there are other sizes in your future. And remember, it is easier to move from a smaller display to a larger display than vice versa.

Window shape

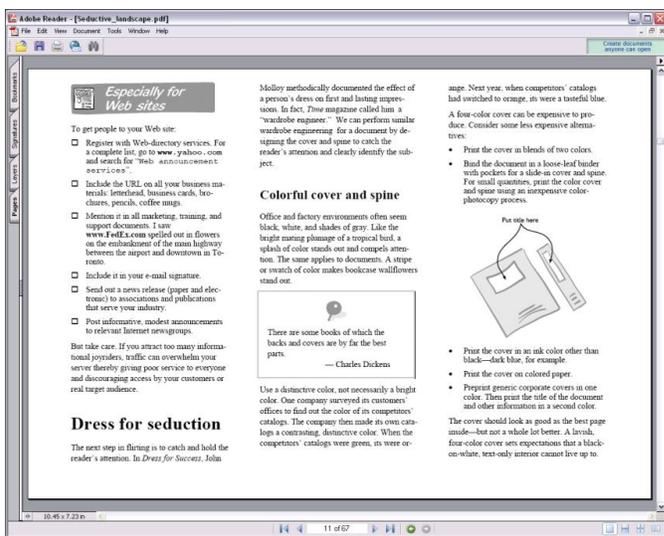
You must design your content to fit your display area. Or shape your window to fit your content. So what shape do you make your window? Is it tall or wide or square? Or do you fit the shape to its purpose? Or do you just fill the screen and take on the shape of the monitor?

Match layout and window shape

Do not waste space and force unnecessary scrolling.



This example of an online reference work was designed for a vertical shape but displayed in a horizontal shape—it was dumped online. The signs of the mismatch are the necessity to scroll to see a complete page and the excessive blank space. And even worse, learners must scroll back to the top to continue reading after the first column.



This next example shows the page reformatted to fit a horizontal window. Now all of the content fits without scrolling and the space is used more efficiently.

My point is not that horizontal displays are better or that scrolling is bad, but that the layout of the content must match the shape of the window and vice versa. In selecting a window shape, you are constraining your layout. Consider the content of your course when you decide on window shape.

What shape is best?

Is a vertical *portrait* shape better than a horizontal *landscape* shape? Let's look at some historically common shapes of information displays and see what their popularity tells us.



Paper sizes have traditionally been portrait shaped. Consider both A4 and U.S. letter size pages.



Formats for still and moving pictures have taken a landscape orientation. Although the exact proportions vary, HDTV, U.S. television, and 35 mm film all use a wide shape.



Well, which is better? Several research projects attempted to determine the answer by letting test subjects reshape display areas to suit their preferences. Most test subjects chose a shape wider than tall. (The proportions chosen were 1.6 times as wide as tall, which is close to a golden rectangle.)



Why was the wider-than-tall shape consistently preferred by test subjects? Probably because it corresponds closely to the human field of vision, which is wider than tall by about the same proportions.



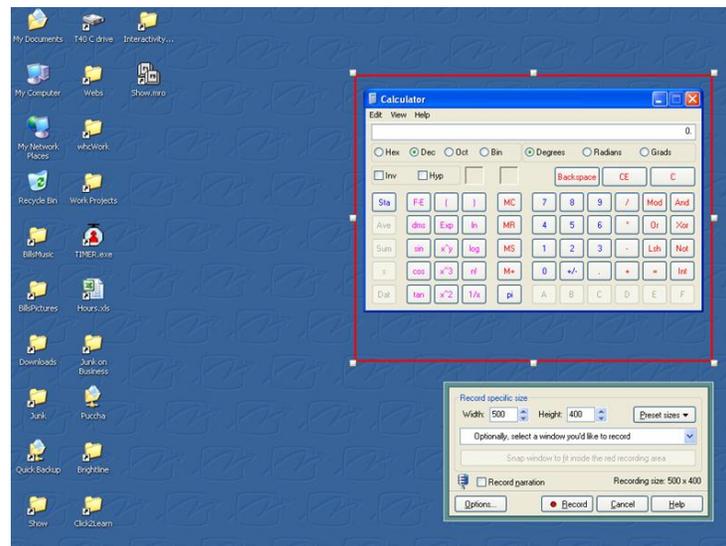
Why then are paper pages taller than wide? The answer is that they are not really. When we read a book, we typically look at a two-page spread, which is wider than tall by about the same proportions as the human field of view.

The answer to our question of what shape is better seems to be a horizontal golden rectangle. At least in theory.

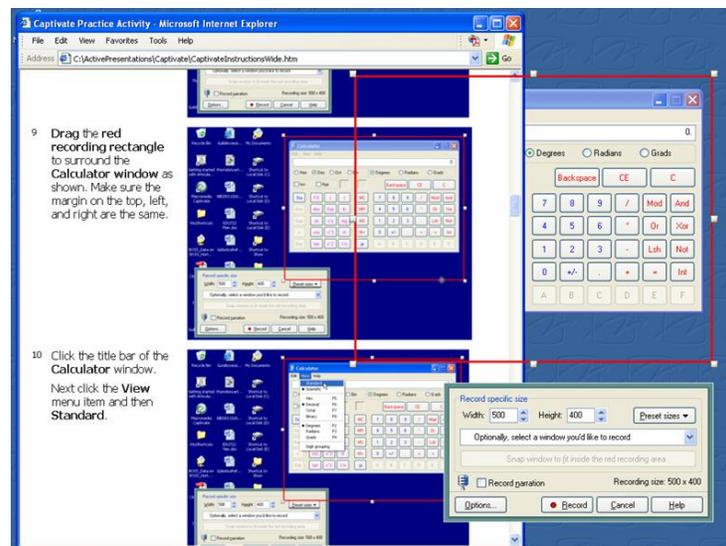
Exception: Hands-on tutorials

One exception to the horizontal-is-best rule is in hands-on computer tutorials.

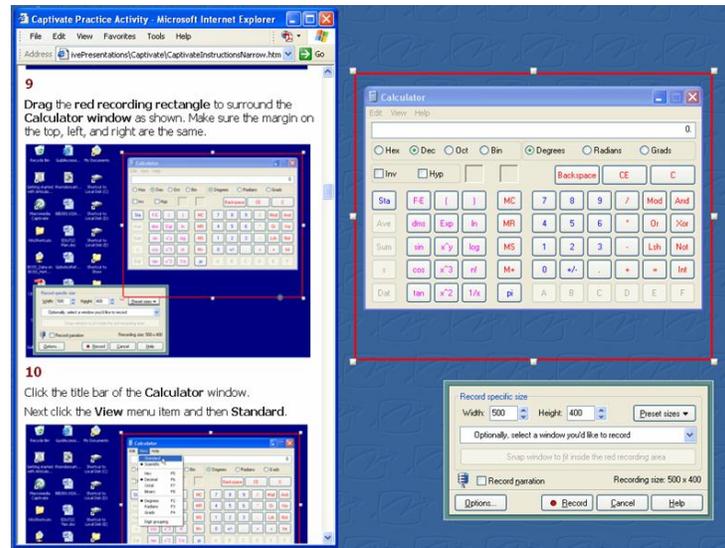
This example instructs learners on how to capture a simulation using the program Adobe Captivate, whose window appears at the bottom right of the screen. Above it a red rectangle surrounds the area to be captured.



Displaying the tutorial reveals the problem with a wide display. Because instructions are beside graphics, the display must be so wide that it intrudes into the area we want to capture, a serious inconvenience.



This example shows the tutorial formatted vertically. Now it fits on the screen beside the Captivate window and the area I need to record.



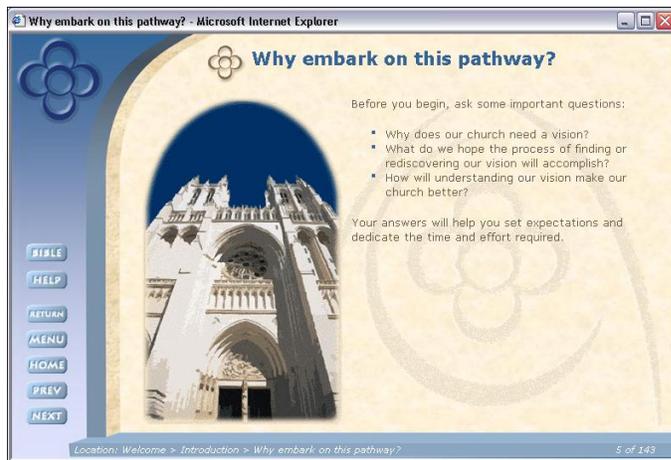
So, when the learner must attend to something other than just our e-learning, we must consider the overall display, not just the e-learning display. The overall display is a horizontal rectangle. The e-learning must be designed to share the rectangular space.

Scrolling or non-scrolling display

Do you use scrolling or non-scrolling displays? That is, do you fit content to the window or let learners scroll to see more? We are talking about vertical scrolling. Horizontal scrolling is almost always bad and should be avoided, except where it is used to allow access to a horizontally oriented graphic, such as a wide timeline.

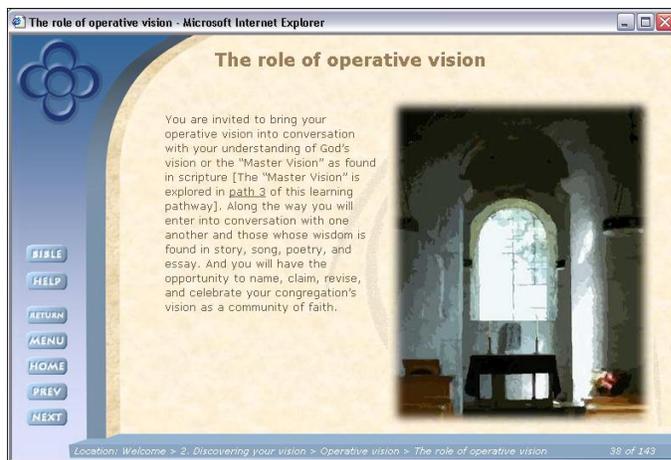
Non-scrolling display

What then is a non-scrolling display? Obviously it is one that does not scroll. What does that look like in practice?

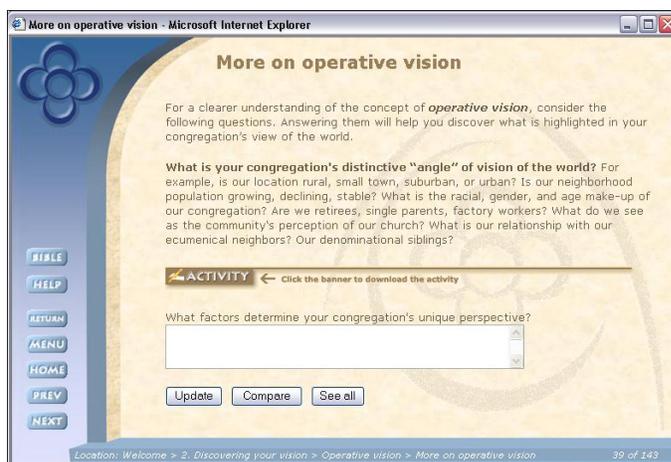


Here is an example. I used a fixed-size, non-scrolling display for the course *Vision and the Church*.

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



Content was selected and sized to fit entirely within the fixed size of the window so that no scrolling was required. This meant that a single aspect of the subject might require several pages.



This non-scrolling display gave the course a card metaphor whereby content appeared as if on a deck of cards all of the same shape and size.

Scrolling display

What do we mean by a scrolling display? It is one that can move vertically in the window to reveal more content.

The screenshot shows a web browser window titled "Interpreting Gantt Charts - Microsoft Internet Explorer". The page has a header with the "the Gantt Group" logo and a title "Critical path". Below the title is a paragraph explaining the critical path. A Gantt chart is displayed with tasks A through J on the y-axis and weeks 1 through 25 on the x-axis. Task A is a blue bar from week 1 to 6. Task B is a blue bar from week 2 to 7. Task C is a blue bar from week 3 to 10. Task D is a blue bar from week 4 to 11. Task E is a green bar from week 1 to 3. Task F is a green bar from week 2 to 5. Task G is a green bar from week 3 to 4. Task H is a green bar from week 4 to 6. Task I is a green bar from week 5 to 8. Task J is a green bar from week 6 to 7. Arrows indicate dependencies between tasks. A left sidebar contains a navigation menu with "critical path" highlighted. At the bottom, there is contact information for the Gantt Group.

Here's an example. I used a scrolling display for the course *Using Gantt Charts*.

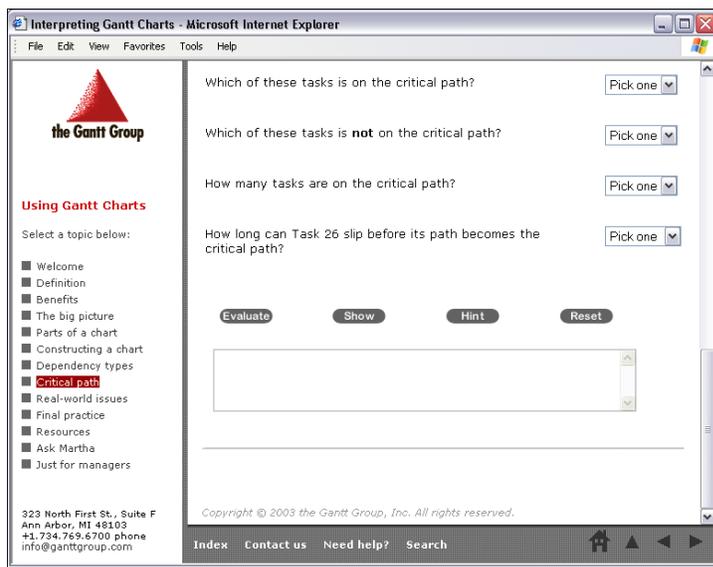
Built using Adobe Dreamweaver, custom JavaScript, and Flash. View example at horton.com/eld/.

The screenshot shows the same web browser window, but the content has scrolled down. The Gantt chart is partially visible at the top. Below it is a section titled "Practice" with a "Narration text" box and navigation buttons: "Restart", "Previous", "Stop", and "Play". A list of four points about critical paths is shown:

1. The critical path is the one without any float lines.
2. Any task on the critical path lengthens the project schedule.
3. Tasks on a non-critical path can expand without slipping the project completion date.
4. If a non-critical path expands to fill the available slack time, then its path may become the new critical path.

Below the list is a "Practice" section with a "Question" and an "Answer" field. The question is "Which of these tasks is on the critical path?" and the answer is "Pick one" with a dropdown menu. The second question is "Which of these tasks is **not** on the critical path?" and the answer is "Pick one" with a dropdown menu. The left sidebar and contact information are still visible.

The learners could scroll downward to see the part of the display not initially visible and to center an interesting part of content in the display. In this example, most topics fit in three scrolling zones.



The space afforded by the scrolling display allowed me to put an entire learning object on a single page. That is, the introduction, learning activities, and assessment appeared together on one page. It also meant that the course had no fixed topic length and that the length was determined by the content necessary to accomplish the objective.

Non-scrolling or scrolling display?

Should you use a non-scrolling display or a scrolling display for your e-learning? Rigid rules may have been appropriate when the Web was new and learners had never sent e-mail or ordered merchandise online. Today the decision requires more thought.

The non-scrolling display is generally better for novice users who might not know how to use a scroll bar or might not notice it if it does not appear for every page in the course. Remember that many highly educated professionals are nonetheless novice computer users. A non-scrolling display is also good to focus on one issue at a time. It ensures that all the content about a topic is displayed at once. Nothing is hidden, and no half-visible content beckons the learner's attention away from the first pieces of content. A non-scrolling display gives you more control of the layout of the display. You can control exactly what the learner sees. You decide what is in the upper-left corner and the lower-right corner.

A scrolling display is usually best for complex content. Such content does not come in simple units that are all the same small size. Complex content can also suffer if related concepts are put into physically separate displays. A scrolling display can avoid the fragmentation that occurs when a topic must be split into separate displays. Learners are less likely to miss related concepts when they are in the same physical page. And scrolling makes it easier to combine presentation and practice right in the same page, thus completing the learning cycle more quickly. If learners will print out pages of your course, scrolling pages make the task easier. With larger scrolling pages, learners have fewer pages to print.

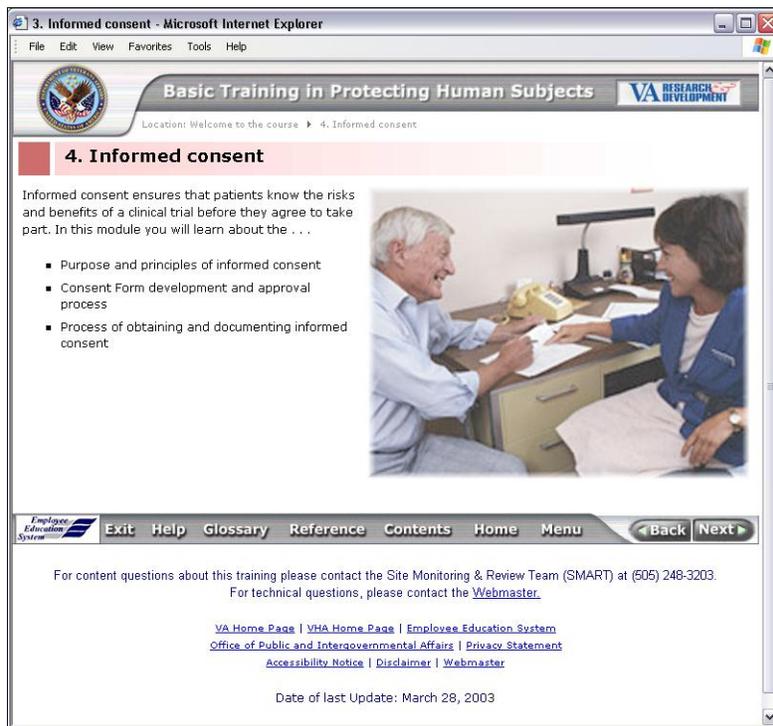
Sometimes designers opt for non-scrolling displays based on outdated research. Yes, research done in 1995 with small numbers of clerical workers who had about 10 minutes' experience using a Web browser indicated scrolling was confusing. Consider that today most popular Web sites such as Google, Amazon.com, and CNN.com all use scrolling as a matter of course.

Fixed or variable-sized display

Do you use a fixed-size display or a variable-sized display? That is, can learners enlarge the window and its contents?

Fixed-size display

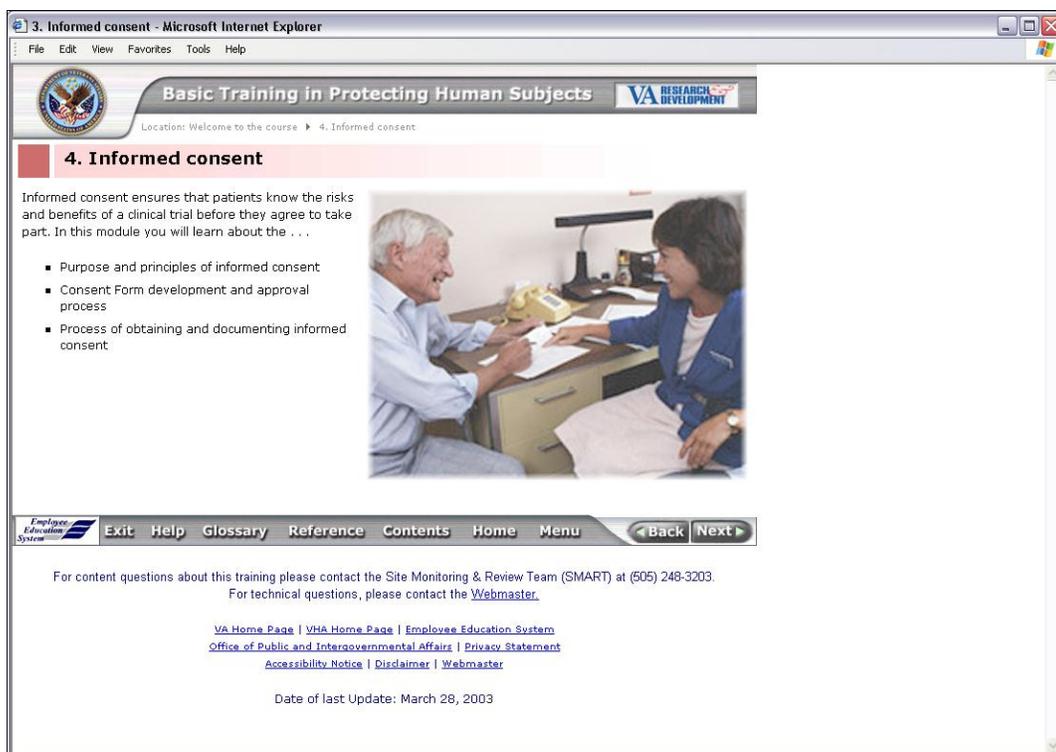
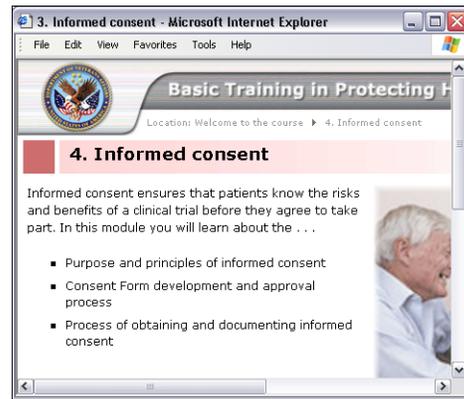
In a fixed-size display, the content displays the same size, regardless of how we stretch the window.



For example, here is a display with its window sized to fit the content.

Designed by William Horton Consulting. Built by VA Research and Development and William Horton Consulting using Adobe Dreamweaver.

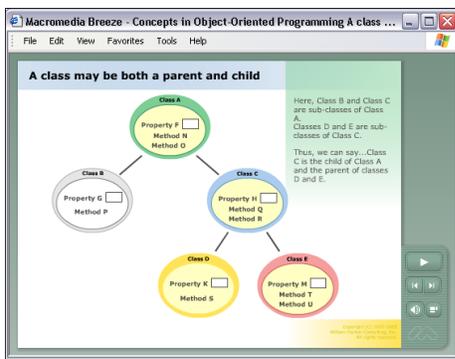
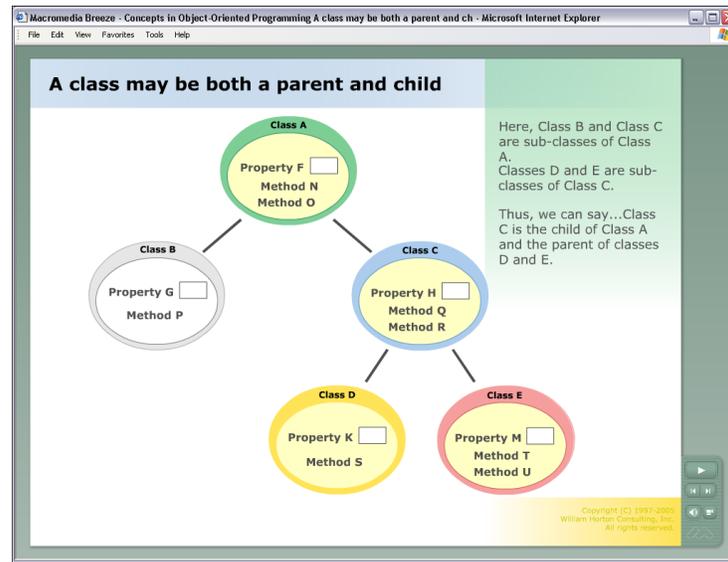
If we shrink the window, the content stays the same size and the window sprouts annoying scroll bars.



Stretching the window larger than the content just displays useless blank space.

Variable-sized display

With a variable-sized display, the content expands or contracts to exactly fill the window. Let's look at an example of a variable-sized display. Here you see the display stretched to fill the full area of the window.



Shrink the window and the text and graphics contract. Notice that the display shows the same material at a smaller size.

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

With a variable-sized display, the learner can stretch or shrink the window. Content grows or shrinks to fit the resized window. The size of the display is not limited to the screen resolution. To make text more legible, learners can stretch the window.

Fixed- or variable-sized display?

Should you use a fixed- or variable-sized display for your e-learning? Where would you use each? Remember, this may not be an option on some mobile devices.

A fixed-size display is good for simplicity and uniformity. Every display is the same size and shape. Controls and other recurring parts of the display always appear the same size and at the same location. This simplicity and uniformity make a fixed-size display the best choice for novice computer users, who may be bewildered by a resizing display or may not even know that they can resize the display. The fixed size is good when implementing a page or card metaphor to indicate that units of display are comparable in size and scope.

On the other hand, a variable-sized display may be best when you have no fixed monitor size. Perhaps you have a widely varied audience or learners will take e-learning on different generations and types of equipment. Perhaps some will want to take your e-learning on some of the newer mobile devices with small displays. A variable-sized display may be necessary if learners need access to other parts of the screen while taking e-learning. The learner can resize or reshape the display to gain access to other information without losing sight of e-learning content. A variable-sized display can help with learners of varying visual acuity—provided the content enlarges when the window is enlarged. Learners with less-than-perfect vision can stretch the window to enlarge the text and graphics.

LEGIBILITY

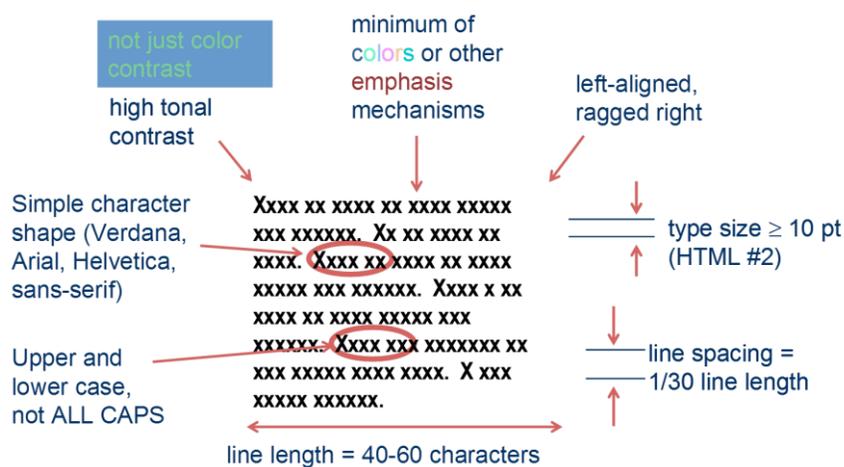
Legibility refers to the ability of learners to read text and recognize graphics. For legibility, we must make content clear, crisp, and easy to read.

Keep text legible

For successful e-learning, we must ensure that readers can actually read the text. Sounds simple, right? It is, provided you follow a few guidelines.

Design text for easy reading

For legibility, we must design text for easy reading. A half-century of research on legibility of displayed text has left us some fairly simple guidelines to ensure that even learners without perfect eyesight can read the text we display.



Our first guideline is to display text in high contrast with its background. That means not just color contrast, but high tonal contrast, such as black on white. Tonal contrast

requires a difference in inherent lightness. Black and white is not the only legible combination, but using any other colors gives up some contrast and potentially some legibility.

Within the body of text, use a minimum of colors or other emphasis mechanisms. That does not mean you cannot occasionally highlight an individual word. Just do not make every third word a bright, bold color. Remember, you can never emphasize more than about 15% of the content in any display.

Align the lines of text of a paragraph along the left edge and leave the right edge ragged. It is OK to center the lines of a label, provided there are no more than three lines. Do not fully justify the lines of text. Doing so inserts spaces between words that encourage the eye to skip to the following line rather than jump the gap to the next word of the current line.

Make the text an adequate size, typically at least 10 points or HTML #2 size. Remember that font sizes on computer displays depend on the resolution of the learner's display, which may be adjustable by a factor of two or more. Font sizes may also be affected by any conversion or scaling process through which your content passes. Evaluate the type size as it appears on the learner's screen.

The next factor is often ignored but is almost as important as type size. Make line spacing one thirtieth of the line length. That ensures enough space between lines that the eye can reliably find the beginning of the next line. With too little line spacing, the eye is prone to repeat the current line or skip the following line.

Speaking of lines, make lines of text in a paragraph 40 to 60 characters long. Shorter lines may waste a bit of space but are seldom a problem for legibility. Longer lines can reduce legibility, especially if the guideline about line spacing is violated.

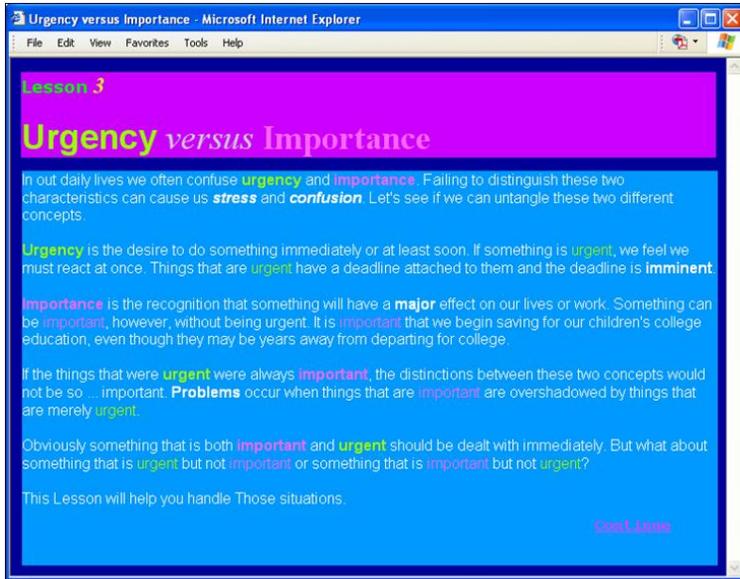
Write text in upper and lower case, NOT ALL CAPITAL LETTERS. Although capital letters look larger, they are actually harder to read because the shapes of letters are less distinctive than for lower-case letters.

Pick a font with a simple character shape. Legible fonts include Verdana, Arial, Helvetica, and the generic san-serif face available in Web browsers and Adobe Flash. Avoid highly stylized fonts, especially for small type sizes.

Beware the Picasso effect

One common mistake made by novice screen designers is playfully called the Picasso effect. It occurs when designers use so many colors and emphasis mechanisms within text that the eye treats the display, not as text to be read, but as a beautiful abstract

composition to be admired. Rather than moving along lines of text, the eye drifts from one bright area to the next.



Try reading the text of this display and you will experience the Picasso effect directly. It is available in living color at horton.com/eld/.

Ensure foreground-background contrast

Rule zero of legibility is to ensure foreground-background contrast. It is Rule zero because if text and graphics do not stand out from the background, they are invisible.

Ensure tonal contrast

Let's consider foreground-background contrast for text.



Which letters stand out in each row?

First against a white background, which letters are most legible?

Now how about a middle gray background?

And finally, against a black background.

The answer is that the legibility of the text depends on its tonal contrast with its background. For this reason, never specify a foreground color without also specifying the background color at the same time.

Light or dark background?

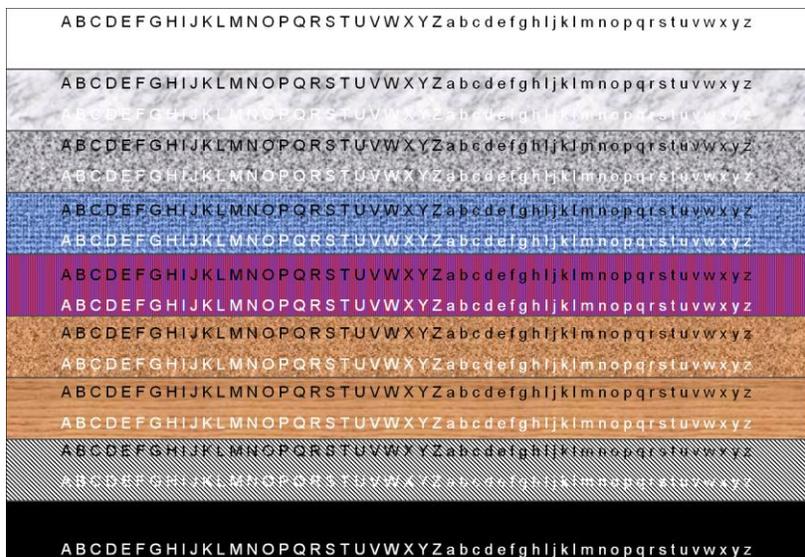
As long as there is tonal contrast between foreground and background, text and graphics can be legible. So which is better, light text on a dark background or dark text on a light background? Twenty-five years ago when displays were dimmer than today and people kept computers in partially darkened rooms, light text on a dark background was regarded as more legible.

However, today, with bright displays and equally bright illumination of offices, most experts opt for the dark text on a light background. Such a combination makes it easier to switch back and forth between reading paper documents and screen displays. And it lessens the glare from light reflecting off the screen. It also has a big practical benefit. Graphics that work on the computer screen remain legible when printed out on white paper.

One exception may be when the color of fine lines and small images is critical, as in interpreting CAD drawings.

Keep the background quiet

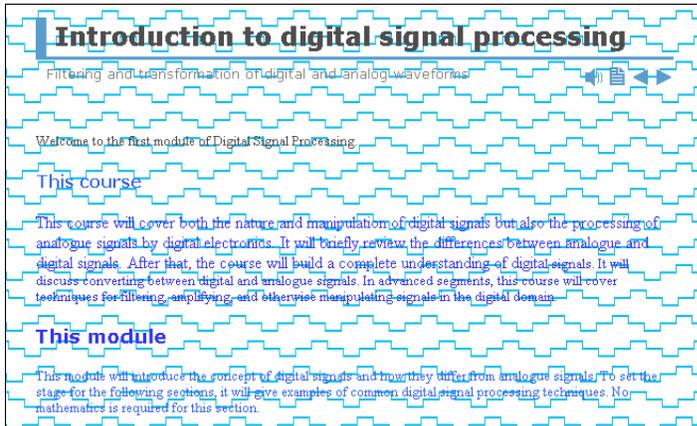
One common practice is to use a texture or pattern as a background. Usually this is done to add visual variety or to achieve a richer look.



Before you use a textured background, look at this example and see which textures make text easier to read. On each texture are samples of text in black and in white.

Most people report that the simpler the texture, the easier it is to read small text. And, as always, higher contrast helps legibility.

Do not sacrifice legibility for supposed visual appeal. Nothing illegible is beautiful.

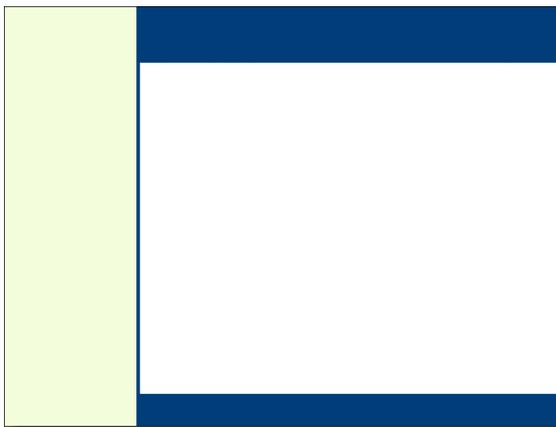


Here is another bad background. It replicates a real example. The waveforms slide across the screen. Do you think the effect makes the text easy to read?

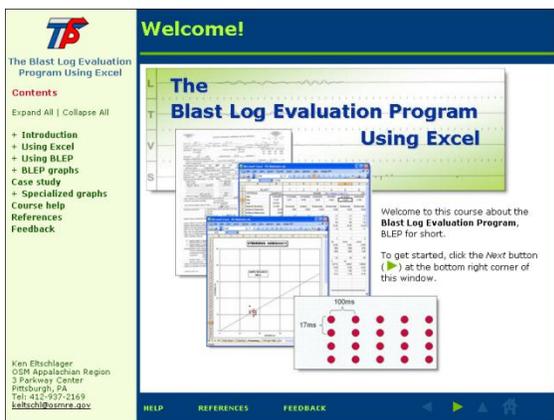
This example is available in color at horton.com/eld/.

Start with a simple, solid background

Start your display design with a simple, solid background. Use a neutral or cool color.



Pick a background color that will contrast with the color of your text and graphics. Use areas of solid color to zone your display, that is, to divide it into functional areas.



Use bits of color to draw attention to small items. Reserve bright colors for use within primary elements of content.

LAYOUT

Layout concerns how you arrange content predictably within the display window. There are many schools of design, and even more rules and fads. In the end, though, the most important characteristic of a layout is that learners find it predictable. That is, they can find the information and controls they seek in the display.

Zone the display

A display can be complex and densely packed and still be predictable. The key is that each area must have a distinct role and learners must be able to infer that role. Here is a test of the basic layout of an e-learning display. It asks potential learners to identify the areas of the display by matching them to the names of the areas.

The screenshot shows a web browser window titled 'Define material profiles - Microsoft Internet Explorer'. The interface is divided into several zones labeled with letters A through I:

- A:** Logo (TIPS) and page title 'GALENA@ Slope Stability'.
- B:** Table of contents menu.
- C:** Contact information (TIPS Training, 1999 Broadway, Denver, CO, 80201-6667, Tel: 303-844-1400, Ext: 1475, nm@osmre.gov).
- D:** Main title 'Define material profiles'.
- E:** Topic number '13'.
- F:** Navigation tabs: Overview, Before, Show me, Coach me, Let me, After.
- G:** Main content area containing a graph and text.
- H:** Special-function buttons (back, forward, home).
- I:** Footer navigation: INDEX, HELP, REFERENCES, FEEDBACK.

The graph in zone G shows a cross-section with a failure circle (Radius = 85 ft) and an embankment. It includes data for water, foundation, and embankment material properties.

Text in zone G: "In GALENA, the material profiles **do not have to follow the slope surface**. Clover Technology suggests that it is best to define profiles according to the original geology, or in as simple a manner as possible. For example, the easiest way to define the top material profile is a horizontal line above the slope surface. This keeps the geology and stratigraphy independent of the slope surface, which is especially important in surface mining. Click the **Show me** tab to see how to enter the material profiles."

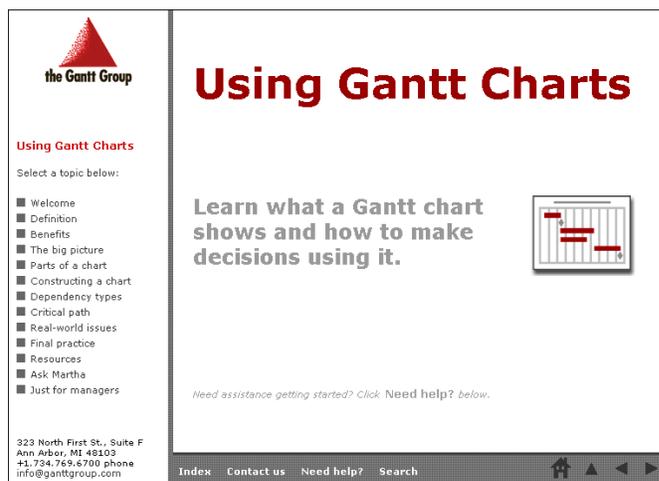
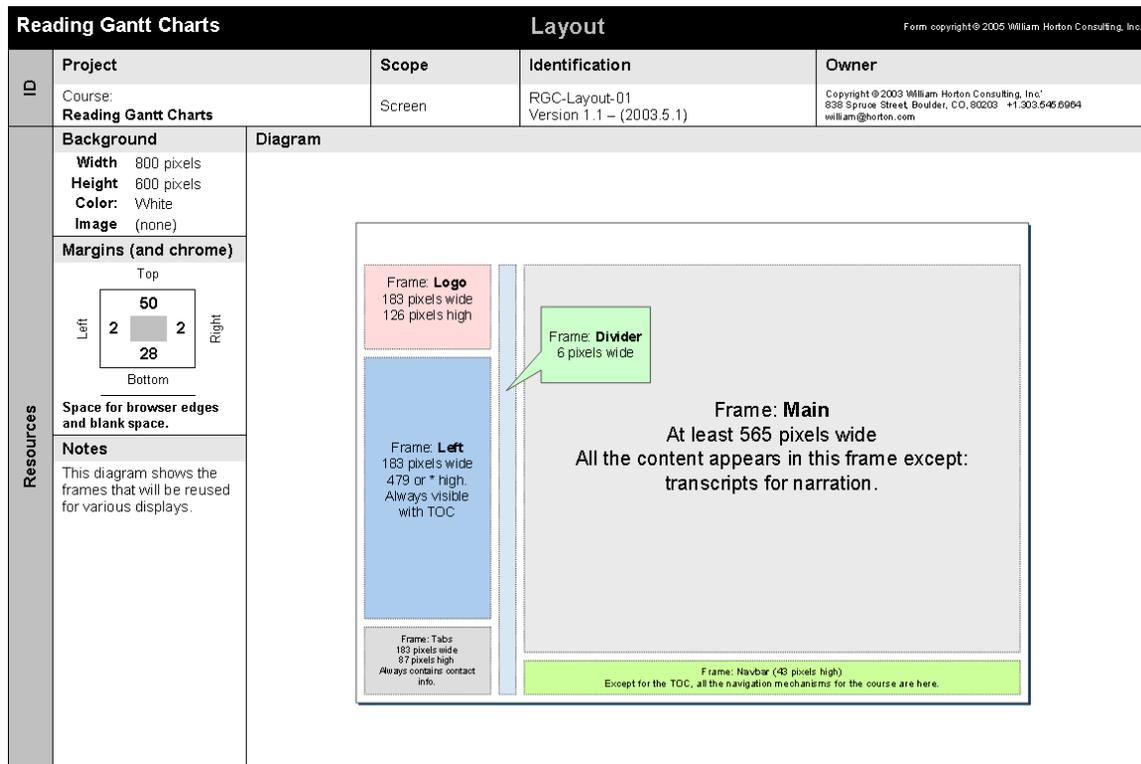
Legend for labels:

- ___ Contact information
- ___ Inter-topic buttons
- ___ Logo
- ___ Main content
- ___ Menu
- ___ Special-function buttons
- ___ Tabs for sub-topics
- ___ Topic number
- ___ Topic title

Simple tests like this help you quickly refine your layout. By the way, the answers are, in order, C, H, A, G, B, I, F, E, and D.

Define a flexible scheme

In designing the layout of your display, use a flexible scheme that can handle different kinds of content and allows for appropriate variations. Here is an example of such a design. It is the layout for the course *Using Gantt Charts*. Notice that it defines several main areas or zones in the display and designates what they will be used for.



Here you see how the layout was used for the title screen.

Built using Adobe Dreamweaver, custom JavaScript, and Flash. View example at horton.com/eld/.

Task bars

Task bars are horizontal bars that show when a task begins and ends. Task bars are the heart of the Gantt chart.

Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
A	[Bar]																									
B						[Bar]																				
C												[Bar]														
D																										
E	[Bar]																									
F			[Bar]																							
G				[Bar]																						
H																										
I																										
J																										

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And here, for the most common layout of content.

Dependencies with lag time

Lagging-start dependencies allow one task to begin only after another task completes and an amount of time has elapsed. Click [Narration text] to see a transcript of the narration.

Practice

Answer the following questions about the multimedia project plan.

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And here, for a variant on that common layout.

Real-world issues

HOW DO GANTT CHARTS AFFECT YOU IN REAL LIFE? WELL, CONTINUE ON ...

- Managing changes** No complex project proceeds exactly according to plan. A good plan accommodates changes and makes it easy for managers to foresee the consequences of slippages and early completions.
- Spotting opportunities** Gantt charts help managers complete projects in less time by letting them spot opportunities to improve the project schedule.
- Reporting to management** Summary-task symbols represent a sequence

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And finally, for a special type of content.

One flexible layout accommodated a variety of types and variations of content.

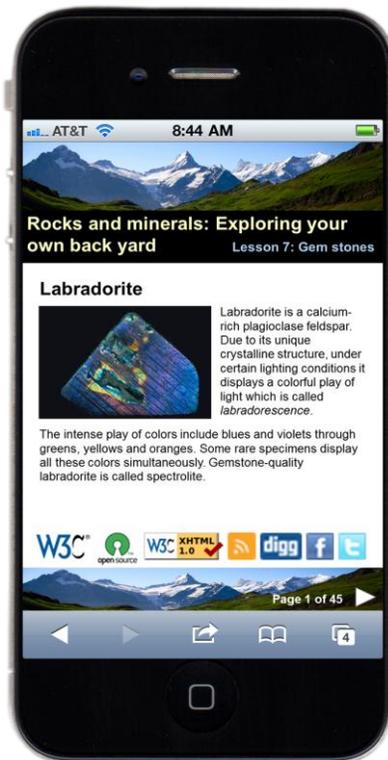
Focus attention on content

Unless learners attend to content, they learn little from it. So use layout to direct learners' attention to the most important parts of your content and away from incidental matter that could distract or confuse.

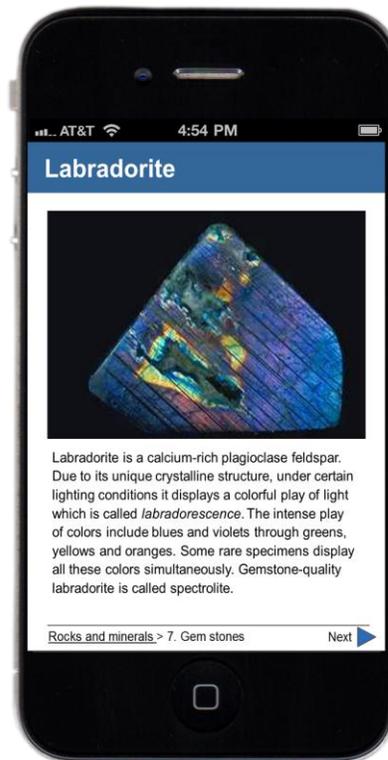
Visually feature content

Often organizational-identity standards require cluttering screens with logos, emblems, and legal gobbledeygook. This is a problem even on large displays where we can use zoning and color to separate essential from incidental. It is a crisis on small displays where noisy gewgaw crowds out crucial content.

☹ No



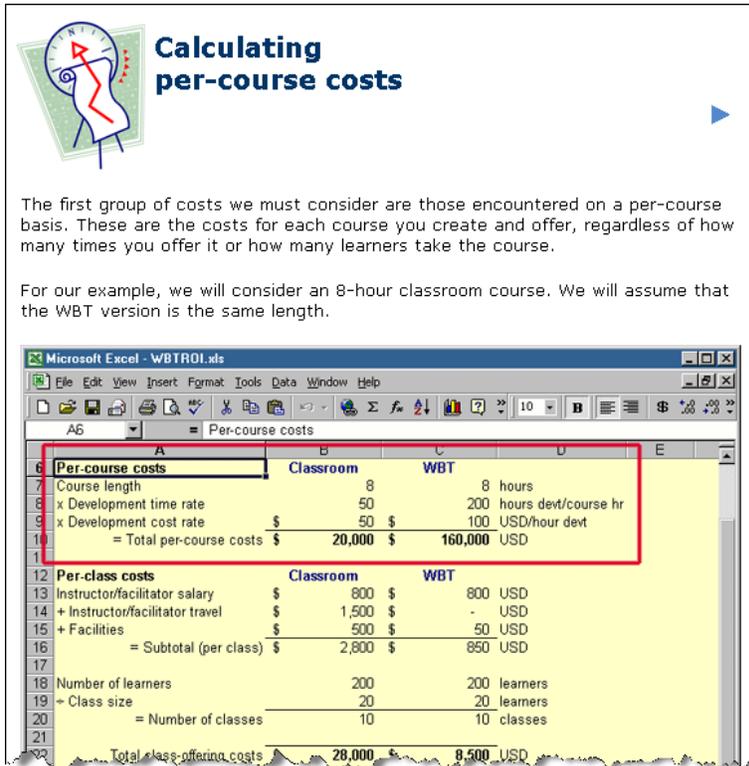
☺ Yes



Put such secondary material on an *about* or *information* page and just include a link to the page throughout your e-learning.

Show only the essential part

One way to focus attention is to display only what you want learners to attend to. Most graphics, in my experience, are too large, complex, and detailed.



Calculating per-course costs

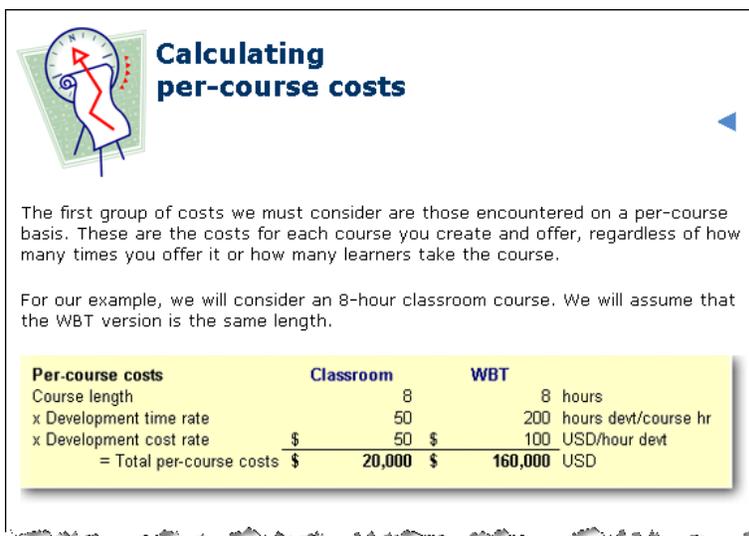
The first group of costs we must consider are those encountered on a per-course basis. These are the costs for each course you create and offer, regardless of how many times you offer it or how many learners take the course.

For our example, we will consider an 8-hour classroom course. We will assume that the WBT version is the same length.

Per-course costs	Classroom	WBT
Course length	8	8 hours
x Development time rate	50	200 hours devt/course hr
x Development cost rate	\$ 50	\$ 100 USD/hour devt
= Total per-course costs	\$ 20,000	\$ 160,000 USD

In this first-draft, only the first five rows of the spreadsheet are important, as indicated by the box around them.

Created using Adobe Dreamweaver and TechSmith SnagIt. View example at horton.com/eld/.



Calculating per-course costs

The first group of costs we must consider are those encountered on a per-course basis. These are the costs for each course you create and offer, regardless of how many times you offer it or how many learners take the course.

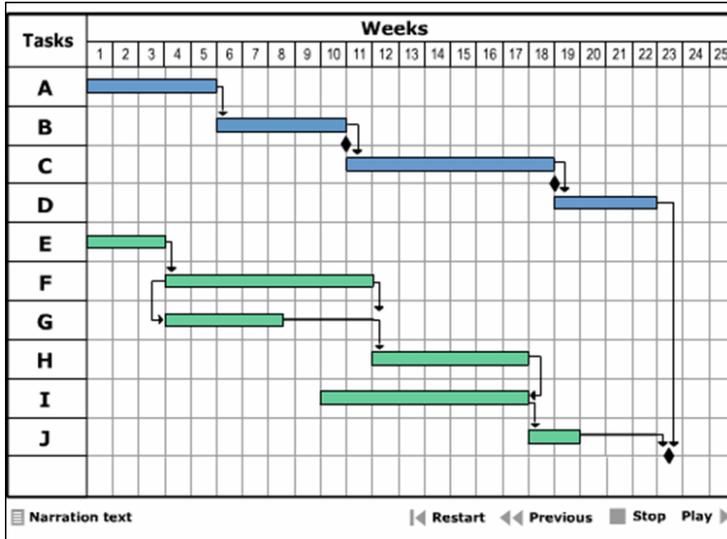
For our example, we will consider an 8-hour classroom course. We will assume that the WBT version is the same length.

Per-course costs	Classroom	WBT
Course length	8	8 hours
x Development time rate	50	200 hours devt/course hr
x Development cost rate	\$ 50	\$ 100 USD/hour devt
= Total per-course costs	\$ 20,000	\$ 160,000 USD

The second draft fixed that problem. The display is simpler and less distracting.

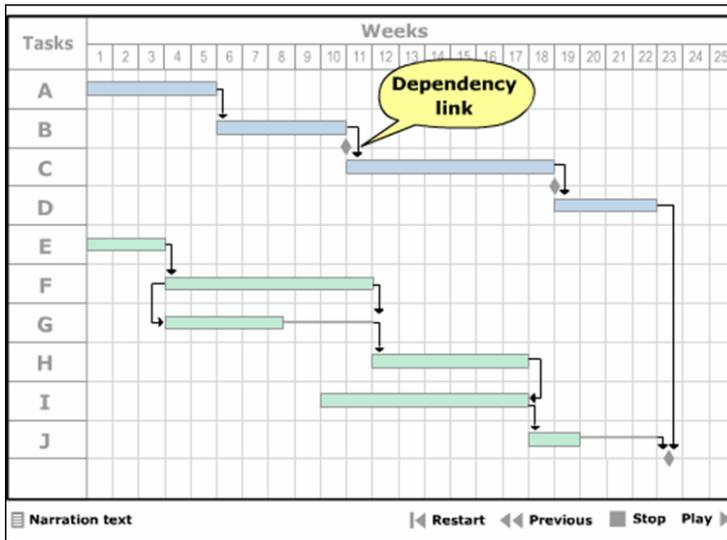
Highlight the item under discussion

Help learners notice what is important. In visual displays, draw the eye to the item under discussion.



In the *Using Gantt Charts* course, a voice narrator commented on simple Gantt charts.

Created using Adobe Flash. View example at horton.com/eld/.



When a particular item was under discussion, other items were dimmed down and a label pointed to the item being discussed.

Beware information overload

Often you will want to include more information than will fit comfortably in e-learning displays. The solution is to first *edit* the text, and then move some of the remaining information to the narration track. Finally, display just key phrases that are synched to the narration.

Feedback **More . . .**

Because of Joanne's phrasing, this question is not relevant to the interview. Joanne may not have intended it this way, but she phrased the question so that it implies that she is trying to find out Gina's marital status. Whether or not Gina is married does not affect her ability to perform the job. This question is potentially unlawful because this question could be considered evidence of discrimination in many states. It is especially important to be careful not to ask male and female applicants different questions. For instance, Joanne probably would not ask a male applicant a question to see if he is married or not, so it could create even more exposure to the company when Joanne asks this type of question of a female applicant.

The primary problem with this question is that Joanne phrased it poorly. She probably had no intention of using any potentially discriminatory questions and whether or not Gina is married should not have any impact on her decision. Joanne probably posed this question without any harmful intention and yet some applicants might find this type of inquiry into their personal life insulting. People are more likely to pursue legal action in situations when they feel insulted or disrespected, and sometimes an applicant does not show signs of being upset even when he or she is. Therefore, phrasing questions carefully is very important for avoiding potential legal action. Most likely, Joanne simply wanted to put Gina further at ease and to find out how Gina would like Joanne to address her during the interview. A better way for Joanne to ask the question is, "How would you like for me to address you? Is it alright for me to call you Gina?" Once Gina tells her, Joanne should respect Gina's request. Joanne also must make sure that she asks this question the same way for male and female applicants. Consistency in questioning is an important strategy for avoiding any appearance of treating applicants differently based on any protected class. Preparation before each interview process helps the interviewer insure that the questions for each applicant are consistent. Click the **More . . .** tab to read additional feedback.

JOANNE
So, do you go by Miss D'Souza or Mrs. D'Souza?

GINA
Oh, I prefer to be called Ms. D'Souza. Or you can just call me Gina.

Listen to the dialog, and then choose whether Joanne's highlighted comment was relevant, lawful, and well phrased.
Click **Show correct answers** to see feedback.

Relevant Not relevant
 Lawful Potentially unlawful
 Well phrased Poorly phrased

Reset Show correct answers

Here is an example of a prototype that revealed the difficulty of combining too much information in one display.

Created in Microsoft PowerPoint.

Interviewing and Hiring Lawfully

Critique

Joanne's highlighted comment or question was:

Lawful
Well phrased

If Joanne were to mispronounce the applicant's last name repeatedly during the interview, he might become offended.

Can I ask you how to pronounce your last name?

Good job, this question is lawful and well phrased.

Indeed, if Joanne were to mispronounce the applicant's last name repeatedly during the interview, he might become offended.

Page 1 of 17

And here is the resulting display from the final course from Global Compliance It shows the value of prototyping your displays with actual content.

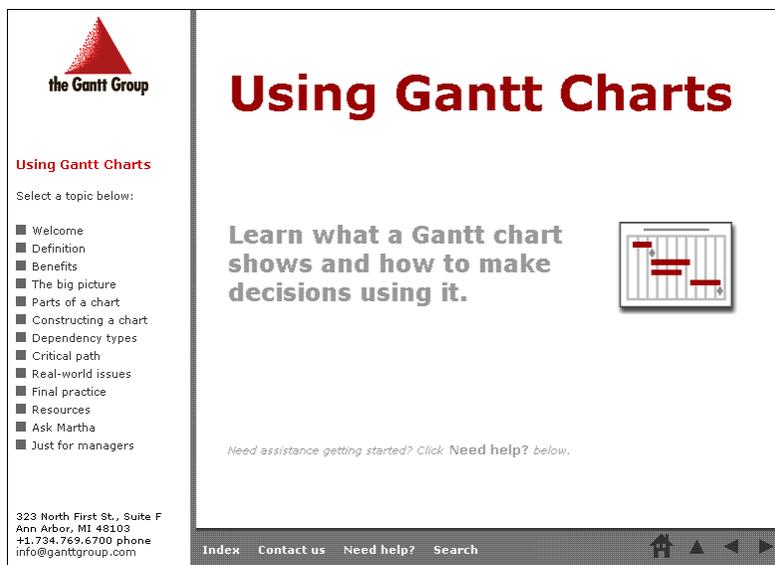
Built using Adobe Flash by Global Compliance.

UNITY

Your e-learning should appear coherent and pleasant. For that to happen, you must ensure a consistent and high-quality look and feel that unifies the entire course or curriculum. If you have been wondering where design considers aesthetics, you will find your answer here.

Case study in unity

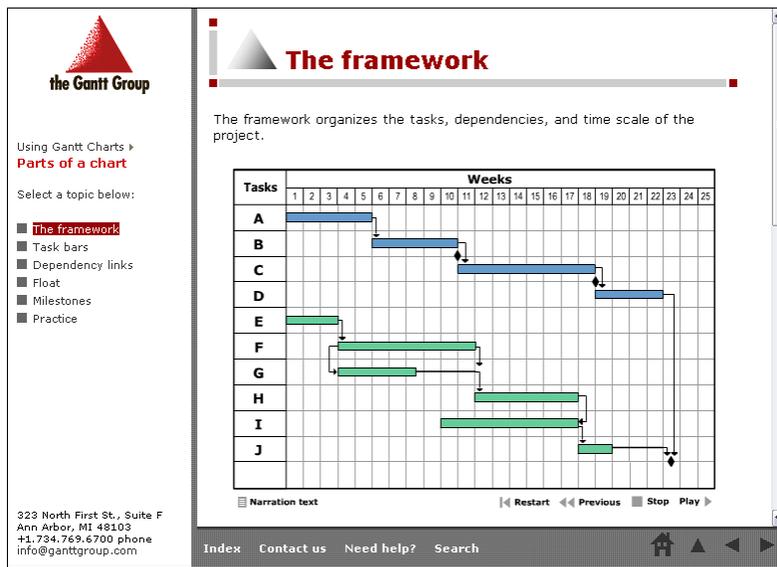
Let's look at some of the displays of a course and see some of the steps taken to ensure that learners perceive them as coherent and attractive.



These pages are all from the course *Using Gantt Charts*. Starting with the title screen, you notice some design themes.

Built using Adobe Dreamweaver, custom JavaScript, and Flash. View example in color at horton.com/eld/.

The simple white background and relatively sparse layout were chosen to avoid noise and clutter. The dark red color used for the title and accents was taken from the client's logo. Normally I would not use red this way, but the course was being offered for free to promote the company offering it. Tying the course to the company was a business objective. Notice that the red chosen was just a shade darker than that of the logo. That was done to increase legibility and to reduce the "aggressiveness" of the color. The only other color was gray. I chose gray so as not to compete with the red. A couple of shades of gray gave me a convenient way to control the relative prominence of text and graphics.



This example shows a typical lesson. Notice the continued use of the dark red for emphasis and grays for secondary matter. The rectangular shape of the sample Gantt chart shows one of the reasons for basing the design on rectangular forms.

The use of rectangular shapes for screen areas, bullets, and graphics gave the display an orderly, business-like look. And the icon on the title bar is simple and generic, as this is the most common type of page, and it contains multiple types of information.

The colors of the bars in the chart are distinct to draw attention, but not so bright that they distract from other parts of the chart. They are deliberately made dark to contrast with the background and to be about equal in prominence with each other.

the Gantt Group

Using Gantt Charts ▶
Parts of a chart

Select a topic below:

- The framework
- Task bars
- Dependency links
- Float
- Milestones
- **Practice**

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Practice interpreting symbols

Question 1:

In the storage shed plan, how many calendar days does it take to frame the structure (Task 8)?

Question 2:

In the storage shed plan, what tasks depend directly on Task 7: Pour the driveway? (Pick all the apply.)

- Task 4: Prepare site
- Task 5: Pour slab
- Task 6 Remove driveway
- Task 8: Frame the structure
- Task 9: Roof the structure.

Question 3:

Index Contact us Need help? Search

A practice activity continues the simple theme. It does not introduce any new colors other than a grayish blue for question numbers. The page icon, in gray, suggests the purpose of the page, namely a practice activity.

the Gantt Group

Using Gantt Charts >
Resources

Select a topic below:

- Henry Gantt
- Software
- Organizations
- Readings

Resources

Intro material to the resources.

- **Who was Henry Gantt?** Here is some background information about Henry Gantt and the circumstances surrounding the development of the management tool that bears his name.
- **Proj. management software** Here is a list of project planning software to manage projects and generate Gantt charts.
- **Professional organizations** Here is a list of professional organizations and conferences devoted to project management.
- **Books and articles** Here is a list of books and periodicals about project management.

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The list of resources includes an icon or emblem suggesting that function. The list items are preceded by square, gray bullets, all part of the theme.

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Using Gantt Charts

Select a topic below:

- Welcome
- Definition
- Benefits
- The big picture
- Parts of a chart
- Constructing a chart
- Dependency types
- Critical path
- Real-world issues
- Final practice
- Resources
- **Ask Martha**
- Just for managers

Ask Martha

Here are some questions that you, as a project sponsor, need to ask the project manager when receiving a Gantt chart about your project . . . and the kinds of answers you want to hear.

Click to see a transcript of the questions and answers.

What questions should I ask before approving the start of a project?

How do I, as a sponsor, know that my project manager is telling me

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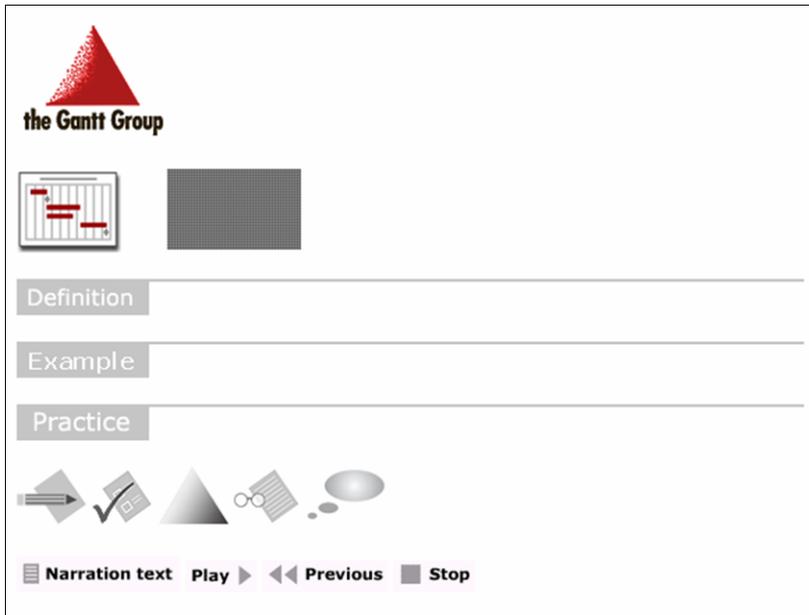
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The “Ask Martha” page lets learners hear Martha Legare, the president of the Gantt Group, answer questions about Gantt charts. The photos are circular, breaking the rectangular motif, but sticking with a simple geometric shape.

Martha’s blazer is red. It was chosen just for the photo shoot so that Martha’s clothes would match theme colors. The color was further adjusted in editing for a more precise match.

Design emblems and theme graphics

Small emblems and theme graphics can help unify e-learning and label its parts at the same time.



This example shows the logos, emblems, dividers, icons, and buttons from the course *Using Gantt Charts*. Here simplicity and consistency were the goals.

Put your theme graphics on a Web page. Then when you want to include one of these graphics, just point to it, right-click, select the **Copy** command, go to where you want to insert the graphic, and use the **Paste** command. Putting all your emblems and theme graphics together onto a single page has the desirable side effect of immediately revealing inconsistencies or missing elements. It also provides a visual reminder of the style you are trying to achieve.

IN CLOSING ...

Summary

- ▶ **First**, start with the functional design of the display; then concern yourself with the form. Get the display working, and then make it pretty.
- ▶ **Second**, remember that aesthetics can be functional too. Learners are more likely to learn from a course they actually spend time taking. They are less likely to resist ideas if they are pleasant to consume.
- ▶ **Third**, specify windows to accomplish the goals of your course and to accommodate your learners. Consider what your course must display and what capabilities and skills learners possess.

- **Fourth**, design consistency into your displays. Set standards for fonts, colors, layouts, buttons, emblems, and other aspects of design. Allow variants when needed, but resist variety for its own sake.
- **Finally**, nothing looks good if it is hard to read. Make sure that text and graphics are large enough and that they stand out from the background.

For more ...

For more ideas on visual design, search the Web for combinations of these terms: *computer screen, display, legibility, layout, ergonomics, and color.*

Standardize the use of color, fonts, and layouts throughout your projects. The design forms available at horton.com/forms can help.

To implement your display designs, define templates for screen layouts and styles for text. Modern Web-page editing tools, such as Dreamweaver from Adobe or Expression Web from Microsoft, can simplify this task.