



# Interactive Design for Online Learning Activities

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(Some sections adapted from the [Webmonkey Information Architecture Tutorial by John Shiple](#))

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## ***Introduction***

A thoughtful top-down interactive design process is the foundation for a great online learning activity. The design document it generates is the blueprint of the activity. The design document specifies structure; functionality; visual, narrative, and structural and metaphors; navigation and interface; and visual design. Regardless of the activity's content or size, following this process completely from start to finish will help the activity meet its objectives and engage its audience. This document describes specific methods for developing an online learning activity using this process, which we have developed and refined with clients over the past decade.

You may be tempted to just wade in, thinking that you already know what you want to accomplish and how it should look and feel. But moving through this process in the order the steps are presented will help you define fundamentals that later stages are based on. Each step is a milestone in the development process. When you complete a step, you will want everyone who has review authority to review and approve the specification in that milestone before you move on to the next step.

If you follow this procedure and use the attached checklist, in the end you will have a complete record of the decisions made in designing the activity. The design document serves as a road map for construction. Additions and revisions are easier, as the design document provides a ready reference for anyone needing to understand the scope shape of the project.

Usability issues are much easier to deal with if you follow this process, too, because you are clear about the needs of your audience and what you want your activity to enable them to accomplish.

### **“Activity” versus “Web site”**

Throughout this document, we refer to the unit of what you are building as the “activity,” rather than the more general term “Web site.” The latter refers to nearly any collection of Web pages or content, whereas “activity” more specifically describes an online module clearly structured to facilitate the user's interaction with the content, with some degree of guidance and scaffolding to support their learning process, and often with some sense of start and finish.

Your organization's Web site may have many sub-sites, some of which may be learning activities. The Web site for a given project may encompass a suite of several activities, each illuminating the subject from a different angle. Some of your planning effort will establish the audience, Big Idea, and learning goals for the entire site; but each activity needs its own focused specification as well, and it is this process that we will guide you through. There are numerous other resources to help you with general Web site development best practices.

## What Do We Mean by “Interactive” and “Learning”?

We like to apply a fairly demanding definition of “interactivity” to online learning materials. Given the present pervasiveness of random-access devices, from audio CD-players to basic Web sites, merely being able to choose what to see or read is no longer very problematic to conceptualize or produce. Reaching higher, we see meaningful interactivity involving at least some of the following elements:

- Offering the user “productive decision-making opportunities” (Strohkorb 2002). This means going beyond menus of choices to select from, and providing an infrastructure for helping the user to construct their own chain of inference and meaning. Giving the user the ability to experience the consequences of their choices is at the heart of state-of-the-art interactivity and game-based learning theory (Prensky 2001, Schank 1992).
- Giving the user something to *do* rather than something to *see*. Manipulating objects and ideas that produce a new construct is a powerful form of interactivity (see discussion of “Design” activities below). Merely manipulating an interface widget is not in and of itself interactive in a meaningful way.
- Enabling two-way communication between real people, whether in real time or not. Failing that, simulating the richness of two-way person-to-person communication with the computer via narrative devices, visual and interface design, and rich feedback from the program, is a way to automate what is otherwise time and resource-intensive.

Defining what makes a Web activity “educational” is just about as slippery as nailing down what counts as interactive. We favor a constructivist, inquiry-based educational approach that includes:

- A clearly focused subject domain. The content matters, and rarely will a generic container be the best form for your particular content.
- Explicit learning goals or outcomes. Different organizations and educational jurisdictions employ a wide range of approaches to developing and describing learning goals. Rather than impose a single ideal approach, we suggest you clarify what your institution and your audience (teachers, for instance) mean by learning goals and how they are described.
- Scaffolding to help the user develop a skill or increase knowledge under the structured guidance of the program. Thus, a database, by itself, may be a tremendous research tool, but it may not actively help the user to develop expertise in using it or understanding of the subject domain (Jonassen *et al*, 1999).

## **Step 1. Goals**

With the increasing emphasis on curriculum standards, almost any educational program, even when used in an informal setting, must begin with clear, well defined, and realistic goals for learning outcomes. The cool factor of an online activity is not enough to transcend lack of focus in learning goals or target audience.

You want input from the people in your organization that will pay for, promote, use, and maintain your Web activity. But you don't want everyone telling you precisely what the final product should look like. You want everyone to agree on the content and purpose of the activity that *you* are going to build.

The more you can front-load the process with information about internal needs and issues, along with your audience and the messages you are trying to communicate, the better guidance you will have in developing and producing the actual product.

Whether it's just you or a committee developing this project, you need to answer these questions about it:

### **How Does This Project Serve Your Institutional Mission?**

This may seem obvious, but reminding yourself of your organization's mission and formally placing it at the top of your design document can help serve as a touchstone for your work, as well as be a useful sales point to those who control money and resources. Stating how your product meets the goals of your organization shows you're thinking strategically.

### **Who Are The Intended Audiences?**

Defining your audiences is critical at this stage, since so many subsequent decisions are affected by your audience definition. Although the educational and institutional goals for your project may dictate a specific audience, such as fifth-graders or home school parents, you A good audience definition consists of:

- Age or grade level. Grade level or age cohort is usually the first distinction educators make in their audiences. Our research has found that different age groups respond to different kinds of online activities in very different ways, so prioritizing grade levels and adult audience segments is crucial. We have also seen differences between boys and girls.
- Degree of existing subject knowledge. Novices need different kinds of learning resources than experts, so having some idea of your audience's expertise will help you develop an activity that is meaningful and satisfying for them.
- Motivations for coming to this activity. There are probably a thousand or more other Web sites out there on your subject—why will users come to yours? Will it help answer utilitarian questions, stimulate their love of learning for its own sake, provide exciting gameplay, satisfy a school assignment, or provoke them to take some action in the real world?

- Expectations for the activity. Expectations are the flip side of motivations but directly affect the structure and content of the activity. Do users expect to spend a long time exploring the site or a short time (the shorter the better) finding the answer to a question? Do users expect to have fun? Interact with other people? Be challenged to think hard? Will they want to come back at another time to continue their experience?
- Other factors. Socioeconomic and cultural demographics may also influence choice of language and visual treatments, as well as technical considerations such as assumptions about the quality of computer and Internet connection a user might have.

### **What’s the Big Idea?**

Museum exhibit consultant Beverly Serrell advocates framing a “Big Idea” for each exhibit (Serrell, 1996). The Big Idea distills the conceptual approach and subject addressed into a single declarative sentence. Choosing and clarifying the Big Idea may be a simple matter or it may be more arduous if there are competing ideas under discussion. But it is essential to arrive at a single Big Idea for a coherent and meaningful final activity. Trying to combine competing topics into one activity will generally result in a convoluted and flawed activity that leads to frustration at best and misinterpretation at worst. Having a Big Idea also helps promote the activity within and without the organization when brief explanations of various online activities are needed.

Here are a few examples of clear and focused Big Ideas:

- The natural and cultural objects that the Lewis & Clark expedition collected helped shape Thomas Jefferson’s view of the American west.
- Visual arts reveal Renaissance innovations in many disciplines which contributed to the making of the modern world.
- Physical and biological factors determine the distribution and abundance of Louisiana’s wetland plant and animal life.
- The ways that Americans produce food have shaped our history, culture, and landscapes—and understanding that history better will help us make intelligent choices about what we choose to eat today.

### **What Are the Learning Goals?**

These goals should be broad enough to represent your overall goals for the project, yet lead to concrete objectives that you can later use to evaluate the success of the project, either through formal summative evaluation or more casual anecdotal evidence. If you must connect your materials to existing standards, do that, too in defining your learning goals.

Defining learning goals for informal or free-choice learning experiences can be thorny. The typical rigor of classroom objectives does not reflect the idiosyncratic nature of free-choice learning (see Falk and Dierking 2000), as few learners will study the material in the same way as they would in a classroom.

### **Gammon's Typology of Learning Goals**

We therefore have found it easier to think about our desired outcomes—what do we want users to *know*, *do*, or *be*. To help frame these outcomes, we often refer to Gammon's (2001) typology of learning goals, which provides helpful keywords for defining learning outcomes. Using this typology to define your learning goals will also help you choose an activity type later.

- Cognitive: Acquire and assimilate new knowledge into existing schemas, apply existing knowledge, connect concepts, draw analogies.
- Affective: Challenge beliefs and values, appreciate view-points in other people, inspire interest, curiosity, awe and wonder, associate curiosity and thinking with enjoyable experiences.
- Social: Develop skills of co-operation and communication.
- Developing skills (mental and physical): Prediction, deduction, problem-solving, investigation, observation, measuring, classification, testing theories, making and telling stories, decision-making, manual dexterity, craft skills, etc.
- Personal: Increasing self-confidence and self-efficacy; motivating to investigate further.

With these types of learning in mind, imagine that you are someone who has just gone through your Web activity. Write a postcard from their perspective describing what you got out of the activity. Frame it in terms of what you now *know*, *can do*, or *are*. For example:

- Dear Mom, I just did a cool web activity about coral reefs. Now I know how important camouflage is for fish living on the reef!
- Dear Janine, I made a fascinating movie on this Web site about food and agriculture. I'm going to look at food a lot differently now when I go to the supermarket.
- Dear Dad, I just solved a mystery about pests in the basement. I'm going to search our basement for hobo spiders now—I know just how to identify them!

Be sure to spend some time writing these postcards, imaging many different things that people will take away from your Web activity. Once you have a good variety, review and revise them, selecting and hone the messages down to your core goals for the project. Then use the postcard messages to draft your actual learning goals. Be sure to frame them concretely, in terms of measurable outcomes. How would you be able to evaluate these outcomes? How would you know if they had actually happened?

### **What Is the Desired Pedagogical Approach?**

Pedagogy greatly affects the activity design. An activity based on information transmission theories of teaching will present didactic content in an organized, building-block fashion, while a truly constructivist activity will consider previous knowledge, experiences, and conceptions of the learners and find ways to help them assimilate and accommodate new concepts. Hein has created a useful diagram of theories of knowledge and learning (see Schaller and Allison-Bunnell

2001 for a summary and discussion of Hein's ideas applied to the Web). Other pedagogical approaches are Bernice McCarthy's 4MAT System, which describes a four-step process based on David Kolb's Experiential Learning Theory of individual learning styles, and Howard Gardner's theory of Multiple Intelligences and his multiple Entry Points. You, or your organization, may have already adopted one of these approaches, or a different one. What's important is to explicitly identify the pedagogy that will guide the development of your online activity. This is important because your Web activity, which is really a piece of software, is a formal, logical representation of the teaching approach that most teachers use tacitly, or casually, in an in-person setting.

### **Design Document: Goals Statement**

Now rephrase the above questions as goals. Put those into a list. If you have a long list, group the goals into categories. Take this list back to everyone who must approve your project and have people rank each goal's importance. If your goals are grouped by categories, have people rank the importance of each category separately. After collecting everyone's rankings, you need to distill them into a master list.

Once you have agreement from everyone involved, document the goals of the activity and publish them where everyone in your organization can see them. If you have time, summarize the list and write a few paragraphs about the goals.

The list of goals is the nucleus of your *design document*, which we mentioned above. After you have published the goals, use them to create the first chapter, called Audience and Goals, of your design document.

## **Step 2. Concept**

### **Comparative Analysis**

Your Web project won't exist in a vacuum. With millions of Web sites out there, it's important to know how yours will fit in, and more importantly, how it will stand out from the crowd. Depending on your project and subject, you may be certain that nobody else has created anything remotely like what you're doing. Unlike a business Web site, where out-selling the competition is everything, informal education sites are very much growing in a garden of a thousand flowers.

However, it can be helpful to briefly survey what peer institutions are doing in your area. This can help justify your approach to funders as truly innovative and supporting current best practices in the area. If you can find 3-5 activities with similar content or approaches, try filling out this list for each, along with tabulating your own approach as you move through the development process yourself. Also unlike the business world, you can probably ask your colleagues at other institutions about their materials:

1. Audience (demographics, reach)
2. Pedagogical approach and activity type (i.e., reference, puzzle, etc.)
3. Depth of content (total volume; depth versus breadth)
4. Functionality and services offered (such as search tool, email updates)
5. Technology (HTML, DHTML, Flash, server-side scripting, database, hardware required to support software and predicted traffic)
6. Ongoing staff commitment required to support features such as bulletin boards or add new content
7. Accessibility (level of Section 508 compliance)
8. Cost (Both in-house and outsourced)

In particular, if you find that items 1-4 above seem to overlap a great deal with what you have in mind for your own project, consider how you can differentiate it from the existing activities as you move forward with your own development process.

Also consider these questions as you develop your own concept and content: What is unique about what your institution does in the real world or what it already does online? Why will people come to the activity the very first time? Will they come back? Is your organization prepared to promote the online product offline? Does this project support another initiative in your organization? If you want repeat visitors, can you commit to ongoing care and feeding of the content to keep it fresh and relevant?

### **What Is Your Conceptual Approach?**

Because online activities lack the personal charisma of a teacher or docent, it is critical to provide an immediately engaging hook to attract and hold your audience. A strict constructivist approach would employ familiar and concrete objects and places to provide a connection between the learner's familiar

environment and the topic at hand. But because the Web attracts learners of all ages in varying settings from around the globe, it's quite difficult to know just what each learner may consider familiar and concrete.

### ***Affective Paths to Understanding***

Educational theorist Kieran Egan offers a way out by re-framing what *kinds* of knowledge come naturally to learners at each stage of development (Egan 1988, 1992, 1998). He argues that our powerful imaginative capacities are much more effective (and *affective*) avenues to learning than the prosaic approaches advocated by Piaget's strictest adherents. Even young children have a deep (if difficult to articulate) understanding of abstract concepts such as good/bad, beauty/ugliness and survival/destruction. Fairy tales and fantasy stories would have little hold on children if this were not the case. These abstractions have deep emotional resonance for children (and adults) and thus are very powerful ways to present new material.

Each new kind of understanding builds on previous stages. In Mythic Understanding, young children begin to organize the world by dividing everything into binary opposites. After they have created basic categories, they start to refine their mental organization of the world in Romantic understanding. Children developing Romantic Understanding typically explore the extremes of reality (from the largest animal to a hero who transcends ordinary limitations and overcomes adversity) to better understand their own place within this order. After gaining a sense of the range and variety of experiences, children start thinking about how they all relate to one another. Much as we would like to teach pre-adolescents about abstract principles and concepts, their understanding of cause and effect is anchored in the actions of individuals.

Philosophic Understanding involves the search for causal connections on a global, systemic level that has birthed scientific and social theories from evolution to Marxism, along with conspiracy theories of all sorts. Acquiring the ability to construct such general schema create a "true believer" with tunnel vision for whom every piece of information must fit into the master theory. But with outside support, we can achieve Ironic Understanding, or a deep appreciation that every theory has both value and limitations. This doesn't mean that adults who employ Ironic understanding can't enjoy *Star Wars*, for the "simplistic" theme of good vs. evil still resonates deep within us. But we can appreciate it for what it is without interpreting real life through the same lens. (See Schaller and Allison-Bunnell 2003 for more on applying Egan's theory to online learning activities.)

What Egan's theory offers us as designers of online learning experiences is valuable guidance about the kinds of abstractions people will find to be intuitively affective, relevant, and meaningful. With our target audiences in mind, choose the most appropriate category below and brainstorm how your topic can be explored through one or more of these characteristics.

Kinds of Understanding	Characteristics
<p><b>Mythic</b> (Ages 3-8)</p> <p>Young children’s main tool for grasping the world is their poetic use of oral language to form understanding. “Look for a core conflict, contradiction or drama that seems to best convey the wonder and emotion of the topic.” (Egan 2003)</p>	<p><i>Binary Structuring</i>  “Forming binary oppositions is a necessary consequence of using language; it is one tool of our sense-making.” (Egan 1998, p. 37)</p> <p><i>Fantasy</i>  Because some binary opposites are discrete (e.g. life/ death, human/ animal), fantasy is a way to mediate between them, i.e., talking animals occupy the middle ground between human and animal.</p> <p><i>Rhythm and Narrative</i>  “Meaning is established in rhythm and narrative by first grasping the whole and then making sense of its parts.” (Egan 1998, p. 60)</p> <p><i>Images</i>  Affective, mental images allow children to incorporate the content and make it part of themselves.</p> <p><i>Metaphor</i>  As a product of language development, “metaphor enables us to see the world in multiple perspectives.” (Egan 1998, p. 58)</p>
<p><b>Romantic</b> (Ages 8-15)</p> <p>“Romance deals with reality, but it does so with persisting mythic interests. It is a compromise with, rather than a capitulation to, reality....In order to help students connect emotionally to the material, teachers need to first identify their own emotional attachment to it. ‘Romance’ invites us to view the world in human terms: not to confuse but to infuse the world with human meaning.” (Egan 1998, p. 86 and Egan 2003)</p>	<p><i>Limits of Reality and Extremes of Experience</i>  “By discovering the real limits of the world and of human experience, we form a context that enables us to establish some security and to establish proportionate meaning within it.” (Egan 1998, p. 85)</p> <p><i>Heroic Transcendence</i>  By associating with real people who have transcended the threats of the everyday world, we too feel some security and some confidence that we can transcend those threats too.</p> <p><i>Obsessive collecting and exhaustive knowledge</i>  “By learning about something exhaustively, one gains the security that the world is in principle knowable.” (Egan 1998, p. 87)</p> <p><i>Humanized Knowledge</i>  “All knowledge is human knowledge...and the most ready and engaging access to understanding [during the early adolescent years] is achieved through the emotions and thoughts tied in with the phenomenon to be studied.” (Egan 1998, pp 92-93)</p>

<p><b>Philosophic (Ages 15-21)</b></p> <p>“The bright bits and pieces [that interest Romantic understanding] are seen increasingly as parts of general wholes, systems, and processes...The core task is to clarify and make conscious those schemes (which may not have been evident to students before) and challenge students to question them and their own schemes as well.” (Egan 1998, p. 121 and Egan 2003)</p>	<p><i>A Craving for General Systems and Patterns</i></p> <p>“The general scheme is what students attend to; particular information is of interest only to the degree that it enlightens the scheme.” (Egan 1998, p. 126)</p> <p><i>The Lure of Certainty</i></p> <p>“Philosophic understanding risks falling into dogmatic assertion of Truth.” (Egan 2003) “</p>
<p><b>Ironic (Age 21+)</b></p> <p>“All generalizations are false” (Egan 1998, p. 137)</p>	<p><i>A Playful Self-Reflective Perspective</i></p> <p>“When we use Ironic Understanding together with other kinds of understanding, we not only make sense of our experience, but we are also aware that that meaning has been constructed by us, and does not exist ‘out there’ in some objective world.” (Egan 2003)</p>

### Selecting an Activity Type or Approach

With an audience, topic, learning objectives, and now a conceptual approach in hand, it’s time to imagine what the user’s experience will be like. What kinds of things will the learner be doing? How will they interact with the content? We define this aspect of the activity design in terms of activity *types*. Based on our previous Web development experience and a review of the literature (Gogg and Mott, 1993; Karat *et al*, 2001; Plowman, 1996b; Sumption, 2001), we have developed a typology to describe some of the common formats for online activities. They are not exhaustive, and there is plenty of room for redefining them. The main point is that they are organized around the type of experience the user has, rather than subject matter or age level. They also help focus on the strengths of the Web as a medium.

- **Role-Play** activities allow users to adopt a persona different from their own, giving them the ability to do things they cannot ordinarily do (e.g. break natural or social laws, experience people and places normally out of reach). They can also interact with other characters, whose behavior either may be scripted or controlled by other players.
- **Simulations** employ a model of the real world that users can manipulate to explore a system. They involve direct engagement with representations of data with some degree of generalization or abstraction. While many activities may have an underlying simulation or model that generates the response to user choices, “simulation” as used here is explicitly framed as such in its presentation to the user, and is used to develop conceptual understanding of a complex system.

- *Puzzle/Mystery* involves analysis and deductive or inductive reasoning to reach a logical solution. The user relies on evidence from people, nature, or reference material provided by the activity to solve the problem. The program provides adequate structure and feedback to allow the user to arrive at a solution and understand the results.
- *Design* emphasizes both open-ended self-expression and the application of subject knowledge and concepts to building some kind of product such as a story, a picture, a movie, etc. These activities combine some sort of tool with content to be manipulated, along with context to support thoughtful use of the tool.
- *Interactive References* are the more traditional hypermedia format for encyclopedia-type content and do not fall under the “goal-based scenario” term. With these, the user can explore a topic through informative words and pictures based on their own interests or curiosity. It is up to the user to navigate through the content, and the structure itself does not impose a particular path or functionality.
- *Discussion Forums* and other social interaction enable users to communicate with one another. While social interaction is one of the Web’s key strengths, it also poses many challenges with a school-age audience, from privacy concerns to risks of inappropriate communication. Many people are also reluctant to post their opinions about subjects that they know little about, making such forums less useful for novices. (Discussions are typically successful with topics that a group of people has deep knowledge and enthusiasm about.)

Our research on online activities and learning styles reveals some patterns of user preferences for particular activities. Of the six activity types, Puzzle Mystery is the one activity type that seems to have the greatest appeal across the broadest range of age and gender. However, there were significant differences in preference for different activity types based on individual learning styles. Furthermore, when compared to children, adults prefer clearly structured Interactive Reference activities that allow them to readily access information they are already interested in or seeking. Children, on the other hand, prefer experiences that contain the motivation to continue through some clear goal or payoff such as Role Play, Design, and Puzzle/Mystery. Females of all ages appear to prefer Puzzle/Mystery more than males, whereas males of all ages tend to prefer Simulations more than females.

As we noted above, these activity types are not rigid, and many real activities contain elements of several types. Because young people of both genders are very attracted to narrative, Role-Play is a powerful framework that can support the logical forms and construction tasks of Puzzle/Mystery and Design. Selecting an activity type helps give it narrative and functional coherence. Just as a murder mystery movie works differently from a screwball comedy, a Design Web activity will present the subject matter differently from an Interactive Reference.

## Engaging Multiple Intelligences

Howard Gardner's theory of Multiple Intelligences has earned wide acclaim and regard from both formal and informal educators. By examining many cognitive modalities, his theory inspires us to stretch the Web's capabilities to engage many different kinds of intelligences. And his Entry Point approach outlines ways to engage the multiple intelligences with entrances to a single learning experience "to accommodate the different lenses through which learners see" (Davis and Gardner, 1993). Consider ways that your activity can incorporate these Entry Points to successfully engage a broader audience.

Entry Point	Learners respond to:
Narrative	The story.
Numerical	Numbers, statistics, and mathematical models, as well as musical rhythm.
Logical	Logical propositions, syllogisms, narrative plot structure and cause and effect relationships.
Existential/Foundational	Big questions about life, death, and our place in the world.
Aesthetic	Surface qualities of art and music, as well as other subjects, <i>i.e.</i> balance in an ecosystem, harmony in the built environment.
Hands-on or Experiential	Direct exploration, both physical and virtual, through experimentation, creativity, and immersive experiences.
Interpersonal	Social interaction through cooperation, debate, and role-play.

## Design Document: Comparative Analysis & Concept Development

Create a new chapter in your design document called Concept Development. Write a summary of the comparative analysis and add it to the design document. Your table can be an appendix or in the main body of the document. Next, describe your topic, learning goals, conceptual approach, and activity type.

### **Step 3. Activity Outline**

Before you dive into writing fun copy and working with your designer on great graphics, you need a blueprint for how the activity will work and what it contains.

If there are specific informational materials or cognitive experiences that must be included in the project to meet standards or your other goals, make a list of those items so you can see what you need to integrate into the activity. If the informational content clashes with the activity type, it's important to bring the two into line before continuing. For instance, presenting a large number of facts probably means that an open-ended Design activity is not the solution.

#### **Activity Sequence Narrative**

We will elaborate a specific structure in the next stage, but for the purposes of review and approval, you now need a brief description of what will happen in the activity, based on the activity type and content you've identified. This should be a couple of paragraphs sketching out the setting and action of the story scenario(s), areas of reference materials, candidates for puzzles to be solved, etc.

#### **Asset Inventory**

This list provides you with the fodder for the precise structure and storyline of your activity. This list of informational content also serves as a "content inventory" during production. What photos do you have to round up? What video is already available? What illustrations will have to be commissioned? Budget and time limitations may mean you have to change some of your goals, or perhaps even the activity type, if you don't have ready access to the materials needed to support a particular activity.

#### **Design Document: Activity Outline & Content**

Create a new chapter in your design document called Activity Outline & Content and include the narrative of the activity flow, use cases, and a summary of the content inventory.

## **Step 4. Structure & Function**

### **Activity Structure & Flowchart**

Now that you know what your activity will include and what flavor you want it to have, you can map out the actual pages or screens that will make up the activity. If you anticipate a large structure, as for an extensive Interactive Reference, write individual items on note cards, and lay them out, and rearrange them. You can also use a flowchart program such as Inspiration (<http://www.inspiration.com>) or MS-Word for revision, printing, and distribution. If your activity is linear, a written outline with numbered paragraphs can be enough to convey the structure and progression through the activity. Brainstorming with designers and writers can be helpful to set the mood of an activity. Revise the content inventory, if necessary, to reflect the new organization of the information, since you may see that some of your material does not fit well with the overall thematic organization you've developed.

### **Functionality**

Now make a list of the functionality your activity requires. Does your activity include allowing a user to save something they've created? Do they need to be able to search for a single item in a large pool of things? The technical implementation of your project will depend on these needs.

Using the content inventory, revise your list of functional requirements. Make sure all of your information and experiences are represented. Work with the technology and production people on your team to determine the feasibility of each requirement. Do you have the technology and the skills to meet each requirement? Do you have the time and money to buy or build the functionality? Do you have the staff resources to maintain your grand creation? You may have to get rid of some in order to meet your deadlines or budget. Attach each functional need to the content it supports in your content outline. Keep your goals up front as you make these decisions.

If your project involves a great deal of custom programming or technical expertise beyond producing standards-compliant Web pages, you will need to expand on the technical issues outlined in the Functional Requirements section. Each functional need must be matched with a specific technical solution. You will need to know what technologies are allowed or supported by your organization's existing Web site. What tools you can use might affect your content. For example, if you can use a server-side scripting tool such as PHP, ColdFusion, or ASP that dynamically creates Web pages based on user choices, you can create a Role-Playing story with many more branching points than if you have to manually create duplicate sets of static Web pages that hard-code every possible path through the activity.

### **Interface & Usability**

The more like an application your activity is, the more you need to conform to existing user interface guidelines and conventions. Some obvious examples

include buttons that look like buttons and windows that behave as expected based on previous experience with Graphical User Interfaces (Johnson 2000).

Web usability guru Jakob Nielsen uses the term “ephemeral application” to characterize a site that users will usually visit only once or infrequently (Loranger and Nielsen 2002). Unlike a program that someone works with regularly, and eventually builds up skill in using, we the developers have one chance to get the interface right, or users will fail and give up in frustration. Here is where a flowchart of the functionality of the activity (as opposed to simply the structure of links between pieces of content) is crucial. The wireframes (discussed below) also must be more detailed to show all the relevant interface states as the user moves through the activity.

### **Activity Outline to Script**

As specific text is written and editorial images are selected and added to the outline, the activity outline will become a full-blown script that can be approved and frozen. It is important for the text and image specifications to be contained in one place that the production team can copy and paste from. Retyping bits of text for headlines, body copy, or captions introduces errors that may be costly to correct if overlooked until late in the process.

### **Design Document: Structure & Function**

Add your Activity Outline to the design document. If the complete script is too long, include it as an appendix. Include a PDF version of your flowchart graphic. Document the global and local navigation schemes, and add your functional requirements and technical solutions.

## **Step 5. Visual Design**

Now you're finally ready for the look and feel of your project. Why the long wait? Good design doesn't just look good. It serves the functional and communications needs of the project. Now you can charge your design team with coming up with a design solution that meets those needs. Since even the most experienced designers are by nature intensely visual people, they often need clear guidance regarding functional needs.

### **Wireframes**

Wireframes are layout grids that show how all the content, interface, and other design elements are physically organized on the screen. They don't have fonts, color, or real text or images. They just show the layout grid. This is where usability issues – what's next to what, where the user's eye is drawn, what will require scrolling to see, how dynamic interface elements work, can be identified and fixed.

You need one wireframe for each unique type of page or screen (and its relevant interface states) in your project. At a minimum, that's usually the main, or home page, top or second level section pages, and second or third level content pages. For more application-like activities, there may only be a couple of interface screens, but a lot may change on them as the user interacts with the activity. Key interface states such as drag and drop and popup windows and dialogs should be modeled.

To get started, take the Activity Outline and make a list of all the page types. Individual pages within a major section or level should be similar. Review the content inventory, then try coming up with two or three generic page types. Start by laying these out and then work from them for the other page types.

We usually distinguish between editorial and design content. Text and images that convey specific information make up the editorial content, whereas text and graphics that create the look, or give instructions, are part of the design. Usually design content is more fixed, whereas editorial content is often added later in production.

Your wireframes can literally be pencil sketches. You can also use a drawing program or the text and graphic layout tools of Microsoft Word. The wireframes should show where all of the content and interface elements go. Pay attention to what appears on a single screen "above the fold" and what the user must scroll to see. (What screen size will most of your users have?) You may have to fit your content into a site-wide frame set with a header, footer, and navigation bar along the side. Make sure that your layout works with this and doesn't compete with or duplicate the global page shell.

Navigation is very important. Global navigation includes the things that a user can do from anywhere in the activity, such as a link back to the home page or a help screen. It must be consistent across every page or screen of the activity. Local navigation systems allow users to move around or manipulate the

interface at a lower level, such as printing their results, or closing a dialog window. These interface elements will be more variable depending on the content and functionality, but it is important to be as consistent as possible. Include both kinds of navigation on your wireframes.

### **Storyboards**

If you have a specific series of images and animations that tell your story (like a traditional movie or introductory sequence), you should turn that part of the Activity Script into a Storyboard that visually shows each shot of the sequence and how it changes. Clip art and simple pencil cartoons are more than adequate. The main thing is to convey to your production staff what the contents of the scene are and what the action is.

### **Prototypes & Usability**

Depending on the size and complexity of your activity, you may be ready to move straight to graphic design comps and actual production. At the very least, you should have at least one other person who has experience with interactive design review the Activity Script and Wireframes for usability and interface consistency (this is sometimes called “heuristic usability testing”).

However, if you are concerned that navigation is complicated, the interface is conceptually complex, or you want to see how a story flows from screen to screen, you may want to turn your wireframes and script into a prototype. Having even a handful of people representing your target audience go through the prototype can pinpoint problems with usability, confusing directions or explanations of concepts, and vocabulary. Be aware that students may have a hard time divorcing form from content and may be turned off by the prototype because it lacks the final graphics and design. Make any changes to the Activity Outline, Script, and Wireframes you feel are appropriate to respond to user testing of the prototype.

There are two kinds of prototypes: paper prototypes and functional prototypes.

#### ***Paper Prototype***

Jakob Nielsen advocates using paper prototypes to iron out usability and functionality issues (Nielsen n.d.). This involves printing or drawing your wireframes, cutting them up, and literally moving them around as if they were on the computer screen. This can be done by the developer to get a handle on interface options, or done with a test subject to assess the usability of the interface. It is fast, inexpensive, and very instructive for complex application-like activities.

#### ***Functional Prototype***

This means making HTML pages with the text and perhaps crucial editorial images, as well as working global and local navigation links on them. The Inspiration application can get you started by turning your flowchart into linked HTML pages. An electronic prototype is appropriate when media such as video is important to user understanding, or if you want to gather feedback online

from a larger audience than you would get with in-person testing. This prototype can help guide your production team. A functional prototype can also be used to solicit further funding for the project.

### **Design Comps & Style Guide**

Design comps establish the look and feel of the activity. They can embody the activity's overall metaphor, but this isn't always necessary. As soon as the wireframes are approved, the design team can add type, graphics, and color to bring the wireframes alive. It's important to work from the wireframes because they have helped you solve your usability issues. Great design can't help a poor layout. If the activity is large and several people will be working on it, or it must be updated later, create a style guide with font, color, and other formatting information such as image treatments and column layouts. A basic design treatment that works for the main page must also be able to be applied to the lowest level pages.

If many people must sign off on the design, create several color schemes and type treatments before working up intricate renderings. Make sure you have approval for the design before going into production! Even in a digital medium, changes can be more time consuming than you might think. It's also very important for the designer's sensibility and style to be well matched to the activity type and audience.

### **Design Document: Visual Design**

Create a new chapter in your design document called Visual Design. Document the wireframes, and be sure to include the flowcharts you made. Compile the design comps and style guide and add those to the document. Include a URL where your functional prototype can be found, and discuss any relevant issues that came up during user testing.

### **Conclusion**

Congratulations! Your design document is now complete, providing a thorough description of the activity's design. It will be useful in constructing the activity, for adding content, and in revising the activity when that time inevitably comes. If the Design Document is ship-shape, the final production and deployment phase is almost anti-climactic, as it should be.

You can see how this process has built upon itself to yield a robust, comprehensive plan for your project. Like any creative process it is both organic and structured. This outline is not meant as a straightjacket, but it is an excellent and indispensable roadmap. By getting approval for significant milestones along the way, you should be able to avoid nasty surprises and keep in budget and on deadline.

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