



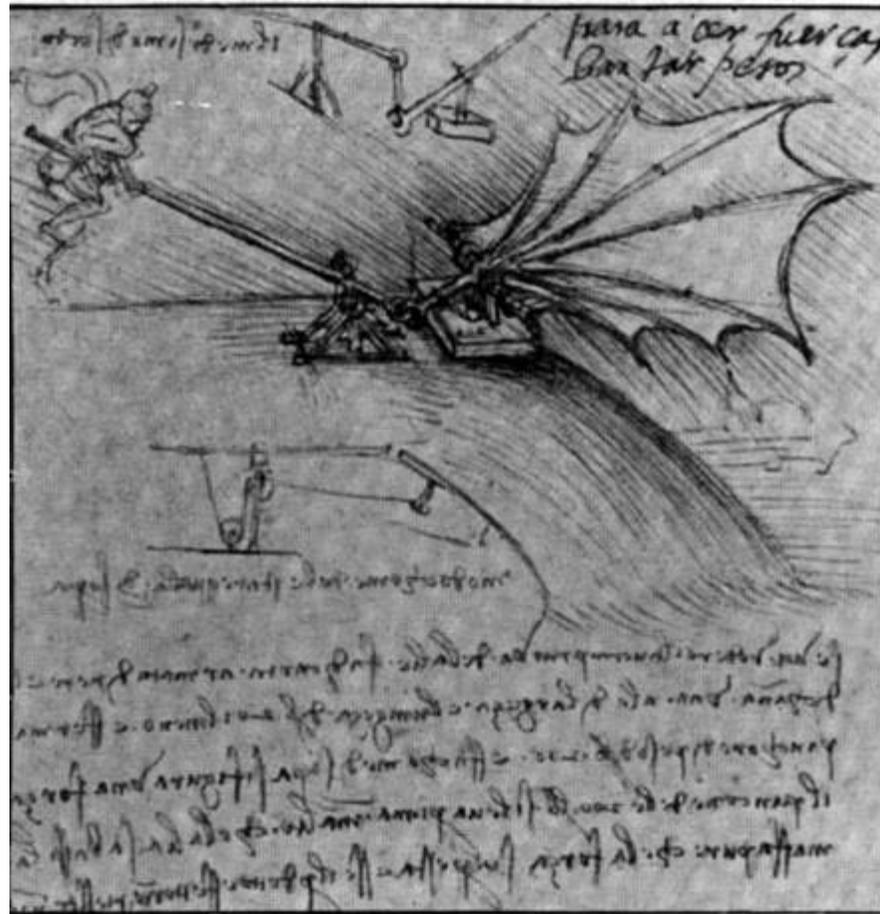
# National Science Digital Library *Reusability and Interoperability Workshop*

## *GUIDELINES - DESIGN*

Copyright 2004 Reusable Learning  
This work is licensed under a Attribution-NoDerivs-NonCommercial 1.0  
Creative Commons License  
(see <http://creativecommons.org/licenses/by-nd-nc/1.0/>).

# Design

---



# Design Layers

---

Layer	Definition
Context	Language, cultural knowledge, subject knowledge, relations to other learning resources and other factors that are needed to properly interpret a digital learning resource
Pedagogy	How a digital learning resource is used as part of a learning strategy or instructional design
Structure	How a digital learning resource is structured into assets, information objects, learning objects, etc. and how these are navigated or sequenced
Content	The information that is contained in a resource and that is intended to affect a change in cognitive state
Presentation	How a resource is rendered and what visual and auditory elements will be used to render it

# Context & Reusability

---

- *Context is the friend of learning and the enemy of reuse*
- Contextual elements that can be isolated or eliminated
  - Culture dependencies
  - Cross-references (See <http://people.morrisville.edu/~kimbert/tvcpm/tvcpmMain.htm>)
- Learning and information objects can be made self-contained: *design for disaggregation*
- Metadata
  - Encodes context
  - Is separate from the learning resource

# Pedagogy & Reusability

---

- *A learning resource is more valuable if it can be used for more types of learning*
  - In-class
  - Online
  - Mentored study
  - Self-study
- Pedagogy is often embedded in sequencing & navigation, style, and content.
  - <http://members.cox.net/bennowak/environment/envla.htm>
  - Separation is better.

## Separating Pedagogy from Structure, Content & Presentation

### Less Reusable

- Forcing a sequence through previous and next buttons
- Referring to a lab experiment throughout a resource
- Using Elementary School Styles 

### More Reusable

- External Sequencing & Navigation
- Isolating components that require specific educational settings
- Addressing as wide an audience as possible

# Structure & Reusability

---

- *Adoption requires structures that isolate components*
- *Adaptation may require re-structuring*
- Standards help
- Structures themselves are reusable!
  - [http://comm.nsdsl.org/project/showfiles.php?group\\_id=46](http://comm.nsdsl.org/project/showfiles.php?group_id=46)

## Separating Content From Presentation

---

- This is the point of mark-up languages
- Key words:
  - Styles
  - XML
  - Re-branding & Skins
  - (Learning) Content Management Systems  
(See Interviewing Skills Course)

Using Dreamweaver

Hide Back Forward Home Print Options

Contents Index Search Favorites

Type in the keyword to find:

converting from HTML to XHTML

- about
- customizing panel layout
- floating layout
- layout
- wrapping lines in Code view
- write permissions on servers
- writing code
- writing code blocks
- XHTML
  - code
  - converting from HTML to XHTML
  - creating pages
- XML
  - DTD files
  - in templates
- Z-Index option (for layers)
  - changing stacking order
  - style definition

Display

## Making pages XHTML-compliant

When you create a new page, you can make it XHTML-compliant. You can also make an existing HTML document XHTML-compliant.

**To create a new, XHTML-compliant document:**

1. Select File > New.  
The New Document dialog box appears.
2. Select a document type.
3. Select the Make Document XHTML Compliant option.  
**Note:** Not all document types can be made XHTML-compliant.
4. Click OK.

**To create XHTML-compliant documents by default:**

1. Select Edit > Preferences or Dreamweaver > Preferences (Mac OS X) and select the New Document category.
2. In the New Document category, select a document type and select the Make Document XHTML Compliant option.
3. Click OK.

**To make an existing HTML document XHTML-compliant:**

- Open a document, then do one of the following:
  - For a document without frames, select File > Convert > XHTML.
  - For a document with frames, select a frame and select File > Convert > XHTML. To convert the whole document, repeat this step for every frame and the frameset document.

**Note:** You can't convert an instance of a template, because it must be in the same language as the template on which it's based. For example, a document based on an XHTML template will always be in XHTML, and a document based on a non-XHTML-compliant HTML template will always be HTML and can't be converted to XHTML or any other language.

**Related topics**

- [About the XHTML code generated by Dreamweaver](#)

# Importance of Layers

---

Context	Context	Context	Context	Context
Pedagogy	Pedagogy	Pedagogy	Pedagogy	Pedagogy
Structure	Structure	Structure	Structure	Structure
Content	Content	Content	Content	Content
Presentation	Presentation	Presentation	Presentation	Presentation
Content Assets	Information Objects	Learning Objects	Learning Components	Learning Environments

## Granularity and Design

Learning Environment	Learning Component	Learning Object	Information Object	Content Asset
<ul style="list-style-type: none"><li>• Don't tie learning components to a learning environment (standards help)</li></ul>	<ul style="list-style-type: none"><li>• Pedagogy and context affect reuse</li><li>• Structural delineation of learning objects important</li></ul>	<ul style="list-style-type: none"><li>• Context matters</li><li>• Avoid navigation that links structure to pedagogy and context</li><li>• SCORM, IMS, AICC help separate structure</li></ul>	<ul style="list-style-type: none"><li>• Like content assets</li><li>• Avoid cross-references that entangle content with pedagogy, structure &amp; context</li></ul>	<ul style="list-style-type: none"><li>• Separate presentation from content</li><li>• Avoid contextual dependence if possible</li><li>• Standards are not specific to learning</li></ul>



## Design - Guidelines

---

**Description:** Design and structure resources for use by as wide an audience as possible.

**Explanation:** Digital learning resources can be viewed as consisting of multiple layers: content, presentation, structure, pedagogy and context. Being aware of the effect of each layer on reusability will help guide design choices. Additionally, reducing interdependence among layers will enhance reusability.

Seven specific Guidelines:

- 3.1 - Self-Contained Learning Experiences
- 3.2 - Separation of Content and Presentation
- 3.3 - Separation of Content and Navigation
- 3.4 - Accessible Design
- 3.5 - Multiple Educational Settings
- 3.6 - Multiple Educational Levels
- 3.7 - Multilingual Support

## 3.1 Self-Contained Learning Experiences – P 1

---

**Description:** Structure content to consist of one or more self-contained learning experiences, each addressing a single topic or learning objective.

**Explanation:** The ease and ability of a resource to be adopted or adapted is increased if the reuser is able to select portions of content that have been designed as self-contained learning experience addressing a single topic or learning objective.

### **Techniques and Examples:**

Developer:

- Using learning objectives as the organizing structure makes it easier to know when a learning resource matches a learning need.
- Eliminate interdependencies between content in different sections of a multi-section resource.
- Structure content with the smallest logical granularity, each with a well defined learning objective(s).



## Example

---

Chemistry Coach -

<http://www.chemistrycoach.com/home.htm>.

## 3.2 Separation of Content & Presentation - P1

---

**Description:** Separate content from presentation.

**Explanation:** The ease and ability of a resource to be adapted is increased by separating content from presentation, enabling the adapter to customize the resource for his/her needs (e.g., for Web sites this can involve using styles, styles sheets and XML-based content formats).

### **Techniques and Examples:**

**Developer:**

- For Web-based resources, use styles, style sheets, and XML-based formats.



## Example

---

Zen Garden” <http://www.csszengarden.com/>

## 3.3 Separation of Content and Navigation – P2

---

**Description:** Separate content from navigation.

**Explanation:** The ease and ability of a resource to be adapted is increased by separating content from navigation, enabling the adaptor to customize the resource for his/her needs. This includes removing intra-section and inter-section navigation elements (e.g., “Previous”/“Next” buttons and links to other sections).

### **Techniques and Examples:**

Developer:

- Eliminate "Previous" and "Next" Buttons/Links by providing a separate section or frame that controls the navigation.
- Eliminate intra-section navigation by providing a separate section or frame that controls the navigation.
- Separate repeatedly used components.
- Use standards and specifications to sequence (order) content.

## Example

---

Ph Factor -

<http://www.miamisci.org/ph/default.html>

Hearing Conservation, environmental safety and health.

[http://www.skillsoft.com/demo/esh\\_gotrain.asp](http://www.skillsoft.com/demo/esh_gotrain.asp)

(also – observe how learner can choose different presentations of same content via preferences)

## 3.4 Accessible Design – P2

---

**Description:** Adhere to accessible design guidelines.

**Explanation:** Accessible design guidelines enable a wider possible use of the resource, in addition to providing support for users with disabilities. In some cases this is a legal requirement (e.g., Section 508 for U.S. Federal Web sites).

### **Techniques and Examples:**

Developer:

- Follow specifications and guidelines for accessible design such as those supported by World Wide Web Consortium Web Accessibility Initiative or the CPB/WBGH National Center for Accessible Media.
- Use authoring tools that include support for accessible design.

# Accessibility

---

Accessible design is good design.

That which some thought to be an intrusion on ‘engaging design’ turned out to be extremely valuable for the reusability and life expectancy of content.

- E.g. Accessible content more easily ports to ‘differently-abled’ clients, such as mobile devices

Resources:

- IMS white paper - <http://www.imsglobal.org/accessibility/accessiblevers/index.html>
- CAST site – Center for Applied Special Technology - <http://www.cast.org/> which provides links to Bobby and other tools.
- National Center for Accessible Media – NCAM - <http://ncam.wgbh.org/>

## 3.5 Multiple Educational Settings – P2

---

**Description:** Design for multiple educational settings.

**Explanation:** The potential audience for a resource is increased by providing support for use of the resource in multiple educational settings (e.g., in-class lecture and self-paced study).

### **Techniques and Examples:**

**Developer:**

- Design the resource to be used in multiple educational settings.
  - Physical requirements
  - Presence of others - Split out the parts that need mentoring



## Example

---

Archimedes -

[http://www.mcs.drexel.edu/~crorres/  
Archimedes/contents.html](http://www.mcs.drexel.edu/~crorres/Archimedes/contents.html).

Data Sets:

<http://www.ipums.umn.edu/usa/index.html>

## 3.6 Multiple Educational Levels – P2

---

**Description:** Design for multiple educational and age levels.

**Explanation:** The potential audience for a resource is increased by providing support for users of multiple educational and/or age levels (e.g., university and high-school use or 7-8 year olds and 12-13 year olds).

### **Techniques and Examples:**

**Developer:**

- Design the resource to be used by multiple educational or age levels. Be aware of how writing style, graphical style and structure affect the appropriateness of a resource for various educational and age levels.



## Example

---

Math.com [www.math.com](http://www.math.com) examples

## 3.7 Multilingual Support – P2

---

**Description:** Design for multilingual support.

**Explanation:** The potential audience for a resource is increased by providing versions in multiple languages or enabling easy translation of content into another language. In some cases this is standard practice or a legal requirement. Care should also be taken to be sensitive to cultural aspects of potential users.

### **Techniques and Examples:**

Developer:

- Consider selecting and using tools that are designed to support multi-language versions of content and software.
- Design for use by diverse users (e.g., background, ethnicity, education level, etc.). Use language, images, scenarios and examples that make sense in as many cultural contexts as possible.



## Example

---

ARIADNE - <http://lkptest.irit.fr/> and log in as a guest (TM5 doesn't work, WBLE does)

## Activity – 30 minutes

---

20 minutes:

1. Review the guidelines and techniques and ask for clarifications.
2. Evaluate a resource (or two) with regard to design. If you find guidelines that have not been met, comment on how the resource could be changed to meet them and whether doing so would be an improvement.
  - First Thanksgiving - [www.plimoth.org/olc](http://www.plimoth.org/olc)
  - Jules Verne Jr., exploring our planet.  
<http://www.dpc.ucar.edu/VoyagerJr/jvvjrtool.html>
3. Apply the guidelines – determine which are met

10 minutes:

4. Discuss evaluations with your table and the larger group.



Next: Interoperability and Standards Demonstration

# Questions? Comments?

---

