



LON-CAPA: The Learning *Online* Network with CAPA  
Course Coordinator Interface

Accessibility Compliance Evaluation Report

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## Executive Summary

The objective of the project was to perform a web accessibility compliance analysis of specified product paths and pages in the LON-CAPA application against Section 508 requirements and Web Content Accessibility Guidelines 1.0 (Priority 1, 2 and 3), and provide recommendations for enhancing its user interface for accessibility.

The evaluation of the LON-CAPA application covered the Course Coordinator Interface pages including the main menu, navigate contents, course documents, resource page, PARM, PARM table mode, and PGRD (7 pages), as specified by the report authors via their experience working with the LON-CAPA Support Coordinator on a usability evaluation of the system interface. While the application does have the option for users to access an alternative interface for greater accessibility, many of the issues discussed in the report apply to both interfaces. Also, the options available for accessibility, such as the suppression of images, the suppression of java applets, the suppression of embedded multimedia, and the black and white contrast mode, can be achieved through following accessibility best practices in one integrated site. The issues we discuss are based on the standard interface, which regardless of the presence of an accessible alternative, should also be made as accessible as possible. Further, we recommend that the application achieve accessibility through one interface.

The application failed a number of Section 508 and WCAG 1.0 Priority 1 standards, as well as a number of Priority 2 and 3 items that will adversely impact the usability of the application by persons with disabilities.

Failed Section 508 and WCAG 1.0 Priority 1 items include:

- Missing or insufficient ALT attribute markup
- Missing table markup, such as TH and ID elements
- Missing form markup, such as LABEL FOR and ID elements
- JavaScript dependent functions

**Including the following elements will also significantly improve the user experience for persons with disabilities:**

**Table and Heading markup**—Identify structural groups of rows (THEAD for repeated table headers, TFOOT for repeated table footers, and TBODY for other groups of rows) and groups of columns (COLGROUP and COL). Ensure that markup is used for differentiating a hierarchy of headers within the page itself, and ensure that these headings are consistent across the site.

**Headers**--Include header (H1, H2) tags to structure page content, provide context and enable text based navigation.

**Link Lists**—Ensure that link lists are used to group similar lists of information (instead of solely through visual formatting such as the use of a table).

**Accesskeys and skip navigation**—Provide users with additional keystroke combinations to facilitate navigation to frequently visited site locations as well as the ability to skip navigation.

A number of lower priority items are listed in the [Summary and Recommendations section](#).

The product should be reexamined after more of the site has been developed and the accessibility enhancements have been made.

# Introduction

## Accessibility and Usability

Companies are finding that enhancing websites and applications for accessibility is a cost-effective and sound business practice. Making web sites accessible to all users, regardless of disability, has become an essential issue for multiple reasons. Analysts for Forrester Research state that government action and an aging population will make web accessibility a priority over the next few years (Forrester, 2001). Also, changes made by Congress to the Federal Rehabilitation Act, Section 508, now require that Federal agencies provide all information available in an electronic or digital format to be made accessible to individuals with disabilities as of June 2001. These standards were designed to specifically address the needs of Federal employees -- including those with low vision or blindness. However, the benefits of designing for accessibility extend beyond disabled users since accessible design principles increase product usability for everyone. For example, designing user interfaces that have consistent navigation and presentation across the web site is important for both accessibility and usability (Swierenga & Walker, 2004; Swierenga, 2002). Additionally, following accessibility guidelines can optimize interaction with emerging technologies, such as personal digital assistants (PDAs), mobile phones, and other small-screen devices that are increasingly able to access the Internet, as well as ameliorate constraints users may encounter, such as dimly-lit or noisy work areas (WCAG).

The purpose of this effort was to conduct an accessibility compliance evaluation on the primary functionality contained in the LON-CAPA application using automated evaluation software (WebXACT/Bobby), manual accessibility checks (using the AIS Accessibility Toolbar), and Freedom Scientific's JAWS for Windows screen reader assistive technology. WebXACT/Bobby was chosen as the best known and most comprehensive automatic website evaluation tool. The AIS Accessibility Toolbar was employed since it facilitates manual evaluation of potential website accessibility issues, especially with respect to usability. JAWS for Windows is the de facto standard in the disabled community for accessing websites and software applications, enabling accessibility evaluators to experience websites as would a person with low vision or blindness, identifying problem areas that could be missed by automatic or manual checking alone.

**Evaluation Scope:** The goal was to identify systematic accessibility issues with the 7 pages of the course coordinator interface. However, investigating technical solutions and performing development work to correct problems are outside the scope of this effort.

## Background on Web Accessibility Standards

### Section 508

Congress amended the Rehabilitation Act in 1998, requiring Federal agencies to make their electronic and information technology accessible to people with disabilities. The law, which went into effect June 21, 2001 (36 CFR § 1194), applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508 (29 U.S.C. § 794d), agencies must give disabled employees and members of the public access to information comparable to the access available to others, complying with standards included in the act. The regulation can be found at <http://www.section508.gov/>. Individuals with disabilities can file suit for corrective action if a Federal agency's website is inaccessible. Furthermore, the Federal Acquisition Requisition (FAR) legislation was amended to require agencies to apply Section 508 standards to contracts awarded on or after June 25, 2001.

## Web Content Accessibility Guidelines (WCAG)

The Web Accessibility Initiative (WAI), in coordination with World Wide Web Consortium (W3C) and other organizations around the world, pursues accessibility of the Web through five primary areas: technology, guidelines, tools, education and outreach, and research and development. Web Content Accessibility Guidelines 1.0 (WCAG) were developed by the WAI to promote greater accessibility of Web sites, browsers, and authoring tools, in order to make it easier for people with disabilities to use the Web. The guidelines are a series of checkpoints describing website elements that must be addressed to ensure accessibility for persons with disabilities.

### WCAG 1.0 Priorities

Each checkpoint has a priority level assigned by the Working Group based on the checkpoint's impact on accessibility.

[Priority 1] A Web content developer **must** satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents.

[Priority 2] A Web content developer **should** satisfy this checkpoint. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint will remove significant barriers to accessing Web documents.

[Priority 3] A Web content developer **may** address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents. Some checkpoints specify a priority level that may change under certain (indicated) conditions.

As with Section 508, many of the accessibility solutions described in WAI materials also benefit Web users who do not have disabilities, allowing Web content to be more available to *all* users, regardless of how they are accessing the information. More detailed information regarding these guidelines can be found at <http://www.w3.org/TR/WCAG10/>.

## Evaluation Strategy

Evaluating websites for Section 508 and Web Content Accessibility Guidelines 1.0 (Priority 1, 2 and 3) standards accessibility compliance involves conducting an assessment against the standards, providing technical recommendations for resolving the issues that are revealed, and implementing an on-going maintenance program. The current project included assessment of specified paths/pages against the Section 508 and Web Content Accessibility Guidelines 1.0 (Priority 1, 2 and 3) standards, and recommendations for enhancing the user interface for accessibility due to the issues uncovered. It is important to note that this project did not include an in-depth investigation of technical solutions, nor did it cover on-going maintenance requirements for the application. The assessment addressed several specific areas of concern including the following<sup>1</sup>:

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<sup>1</sup> Categorizations and descriptions of standards and guidelines have been simplified in some cases to improve understanding.

## § 1194.22 Standards Areas for the Web (Section 508)

Standards	Description
<b>Alt text on images and image maps</b> See standards: (a) (b) (e) (f)	Provide descriptive text for every image.
<b>Color</b> See standards: (c)	Use color only as a redundant code.
<b>Style sheets</b> See standards: (d)	Ensure that the document is readable when style sheets are turned off.
<b>Table cell identification</b> See standards: (g) (h)	Use HTML markup to identify row and column headers for data tables.
<b>Frame titling</b> See standards: (i)	Use name and title attributes for each frame; use title tags on the pages as well.
<b>JavaScript</b> See standards: (k) (l)	Use a screen reader to ensure that JavaScript is functioning correctly.
<b>Electronic forms</b> See standards: (m) (n)	Use alternative text or labels for all form elements.
<b>Skip navigation</b> See standards: (o)	Provide users with a way to skip repetitive navigation links
<b>Flicker and timed responses</b> See standards: (j) (p)	Avoid rapidly flickering images and make sure that pages requiring a timed response have a pause button as well.

## Web Content Accessibility Guidelines 1.0

Standards	Description
<b>Alt text on images and image maps; multimedia</b> (Priority 1) See standards: 1.1, 1.2, 1.3, 1.4, 3.1, 4.1, 6.2, 9.1, 14.1	Provide descriptive text for every image and alternative text for multimedia.
<b>Color</b> (Priority 1 and 2) See standards: 2.1, 2.2	Use color only as a redundant code. Ensure that foreground and background combinations provide sufficient contrast.
<b>Style sheets</b> (Priority 2) See standards: 3.3, 3.4, 6.1	Ensure that the document is readable when style sheets are turned off. Use style sheets to control layout and presentation. Use relative rather than absolute units in markup language attribute values and style sheet property values.
<b>Document structure and content</b> (Priority 2 and 3) See standards: 3.5, 4.3, 5.3, 5.4, 9.4, 11.3, 12.3, 13.2, 13.3, 13.4, 13.8, 14.3	Use header elements to convey document structure and use them according to specification. Place distinguishing information at the beginning of headings, paragraphs, lists, etc. Create a logical tab order through links, form controls and objects. Divide large blocks of information into manageable groups. Provide metadata to add semantic information to pages and sites. Identify the primary natural language of a document. Provide information so that users may receive documents according to their preferences (language, content type, etc.). Provide information about general site layout (as in a site map). Use navigation mechanisms and presentation styles consistently. Do not use tables for site layout unless the table makes sense when linearized. If a table is used for site layout, do not use structural markup for visual formatting.
<b>Table cell identification</b> (Priority 1) See standards: 5.1, 5.2	Use HTML markup to identify row and column headers for data tables. For data tables that have two or more logical levels of row or column headers, associate data cells and header cells.
<b>Frame and page titling</b>	Use name and title attributes for each frame; use title tags on pages.

(Priority 1) See standards: 12.1	
<b>JavaScript and Java; automated functions</b> (Priority 1 and 2) See standards: 6.2, 6.3, 6.4, 7.2, 7.4, 7.5, 8.1, 9.2, 9.3, 10.1	Make programmatic elements directly accessible or compatible with assistive technologies. Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. Ensure that equivalents for dynamic content are updated when the dynamic content changes. Ensure that event handlers and elements with their own interfaces are independent of input devices. Until user agents (such as AT devices) provide user control over page behavior: avoid causing content to blink; do not auto-refresh pages; do not redirect pages automatically; do not cause pop-ups or other windows to appear and do not change the current window without informing the user; and avoid movement in pages.
<b>Electronic forms</b> (Priority 2) See standards: 10.2, 12.4	Use alternative text or labels for all form elements. Associate labels explicitly with their controls.
<b>Flicker and timed responses</b> See standards: 7.1	Avoid rapidly flickering images and make sure that pages requiring a timed response have a pause button as well.
<b>Links</b> (Priority 2 and 3) See standards: 10.5, 13.1	Clearly identify the target of each link. Until user agents (such as AT devices) render adjacent links distinctly, include printable characters between them.
<b>Supplemental information and navigation</b> (Priority 2 and 3) See standards: 4.2, 5.5, 5.6, 9.5, 12.2, 14.3	Provide additional information for adaptive technology users that will facilitate comprehension, such as: specify the expansion of each abbreviation or acronym where it first occurs; provide summaries for tables; provide abbreviations for table header labels; supplement text with graphic or auditory presentations; and describe the purpose of frames and how frames relate to each other if not obvious by frame titles alone. Provide elements that will facilitate navigation for adaptive technology users, such as: keyboard shortcuts to important links, form controls, and groups of form controls; group related links and provide a way to bypass them; and provide a means to skip over multi-line ASCII art.
<b>Valid Code</b> (Priority 2) See standards: 3.3, 3.6, 3.7, 11.2, 11.3	Create documents that validate to published formal grammars. Mark up lists and list items properly; mark up quotations. Use W3C technologies when they are available and appropriate for a task, the latest versions, and avoid deprecated features.

The product pages were assessed in three ways: evaluation with an automated accessibility checker (WebXACT/Bobby), manual review with Internet Explorer and the AIS Web Accessibility Toolbar, and an expert review using the JAWS screen reader. Recommendations for resolving accessibility problems are based on the *Constructing Accessible Web Sites* (Thatcher et. al, 2002) technical resource.

This review was applied to the model "Usability – Student" course developed by Felicia Berryman, the LON-CAPA Support Coordinator for our use during a usability evaluation. For this 7-page analysis, we concentrated on the main navigation areas and heavily used paths, which included the following pages (which can be accessed by logging in with a valid ID and password):

- [Main Menu](http://s2.lite.msu.edu/adm/whatsnew?refpage=start)  
http://s2.lite.msu.edu/adm/whatsnew?refpage=start

- [Navigate Contents](#)  
http://s6.lite.msu.edu/adm/navmaps?postdata=%2fadm%2fwhatsnew&postsymb=
- [Course Documents](#)  
http://s6.lite.msu.edu/adm/coursedocs
- [Model Homework Problem \("Smile" Clickable Image Problem\)](#)  
http://s6.lite.msu.edu/res/msu/felicia/usability/click-on.problem?symb=uploaded%2fmsu%2f6r882514d466b44e1msu1%2fdefault\_113337544388251147878028%2esequence\_\_\_8\_\_\_msu%2ffelicia%2fusability%2fclick%2don%2eproblem
- [Table Mode in PARM](#) (also PPRM from the Resource Page)  
http://s1.lite.msu.edu/adm/parmset?action=settable
- [Grading \(PGRD\)](#)  
http://s6.lite.msu.edu/adm/grades
- [Parameter Manger \(PARM\)](#)  
http://s1.lite.msu.edu/adm/parmset

[Table 1](#) provides a summary of the findings resulting from the LON-CAPA Course Coordinator interface 508 accessibility assessment.

[Table 2](#) provides a summary of the findings resulting from the LON-CAPA Course Coordinator interface W3C WCAG (Priority 1, 2 and 3) accessibility assessment.

Comments refer to all pages tested in Web site, unless otherwise noted. Screenshots of pages reviewed are available in [Appendix 1](#), as linked above.

Table 1 – Section 508 Evaluation Summary for LON-CAPA (Course Coordinator Interface)

§1194.22	Section 508 standards	Yes/ OK	No/ Fix	N/A	Comments
(a)	A text equivalent for every non-text element shall be provided (e.g., via "alt", "longdesc", or in element content).		No		Many non-text elements are provided text equivalents. However, certain images still require alternative text or the null attribute alt="", such as the folder icon images on the Course Documents page. The logo could probably be replaced by null image attribute (alt=""), since it doesn't provide critical information. Also, some image descriptions could probably be written more explicitly, such as the alt text for the button on the main menu.
(b)	Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.			N/A	No multimedia presentation on pages tested.
(c)	Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.	Yes			Color is used to group similar items of interest; however, they are also grouped by proximity or underlined. Color has to be a redundant element.
(d)	Documents shall be organized so they are readable without requiring an associated style sheet.	Yes			Style sheet unnecessary to read site.
(e)	Redundant text links shall be provided for each active region of a server-side image map.			N/A	No server-side image maps on pages tested.
(f)	Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.			N/A	No server-side image maps on pages tested.
(g)	Row and column headers shall be identified for data tables.		No		Data tables, such as those located on the Resource Parameter Table Mode or the Main Course Documents table, do not appear to include row or column headers. Use the TH attribute to associate table cells with their corresponding row and/or column.
(h)	Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.		No		Data tables, such as the Ste/Modify Course Parameters table, with two or more logical levels of row or column headers did not include TH, Thead, th colspan, id, tbody or table summary markup to assist non-visual users navigate through the table.  Identify structural groups of rows (THEAD for repeated table headers, TFOOT for repeated table footers, and

§1194.22	Section 508 standards	Yes/ OK	No/ Fix	N/A	Comments
					TBODY for other groups of rows) and groups of columns (COLGROUP and COL). Label table elements with the "scope", "headers", and "axis" attributes so that future browsers and assistive technologies will be able to select data from a table by filtering on categories.
(i)	Frames shall be titled with text that facilitates frame identification and navigation.			N/A	No frames on site.
(j)	Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.			N/A	No flickering images
(k)	A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.		No		A text version of application is provided, however, compliance can be achieved in a single version of site.
(l)	When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.		No		Graphical buttons, such as those located on the Main Menu page and certain Help buttons, are not usable when JavaScript is turned off. Consider using CSS for button actions instead of JavaScript. If you choose to use JavaScript, ensure that the JavaScript degrades gracefully.
(m)	When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with §1194.21(a) through (l).			N/A	The web pages tested do not require an applet, plug-in or other application.
(n)	When electronic forms are designed to be completed on-line, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.		No		Use label for, and IDs to associate field labels with their associated text box. Use fieldset, and legend tags to group form content.
(o)	A method shall be provided that permits users to skip repetitive navigation links.		No		Skip link to main content not provided.

§1194.22	Section 508 standards	Yes/ OK	No/ Fix	N/A	Comments
(p)	When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.			N/A	No timed responses required by pages tested.

Table 2 – WCAG 1.0 Evaluation Summary for LON-CAPA (Course Coordinator Interface)

WCAG 1.0	Priority 1 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
1.1	Provide text equivalent for every non-text item (e.g., via "alt", "longdesc", or in element content).		No		See <a href="#">Section 508 (a)</a> above.
1.2	If using images or image maps, provide redundant text links for each active region of a server-side image map.			N/A	See <a href="#">Section 508 (e)</a> above.
1.3	Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation.			N/A	No multimedia presentations on pages tested.
1.4	For any time-based multimedia presentation (e.g. movie, animation), synchronize equivalent alternatives with the presentation.			N/A	See above.
2.1	Ensure that all information conveyed with color is also available without color.	Yes			See <a href="#">Section 508 (c)</a> above.
4.1	Clearly identify changes in the natural language of a document's text and any text equivalents.			N/A	No changes in language.
5.1	In data tables, identify row and column headers.	Yes			See <a href="#">Section 508 (g)</a> above.
5.2	In data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells.			N/A	See <a href="#">Section 508 (h)</a> above.
6.1	Organize documents so that they may be read without style sheets	Yes			See <a href="#">Section 508 (d)</a> above.
6.2	Ensure that equivalents for dynamic content are updated when the dynamic content changes.			N/A	No dynamic content was encountered on the pages tested.
6.3	Ensure that pages are usable		No		See <a href="#">Section 508 (l)</a> above.

WCAG 1.0	Priority 1 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
	when scripts, applets, or other programmatic objects are turned off or not supported. If not possible, provide equivalent information on an alternative accessible page.				
7.1	Until user agents allow users to control flickering, avoided causing the screen to flicker.			N/A	No flickering images on pages tested.
9.1	Provide client-side Image maps instead of server-side image maps except where the regions cannot be defined with an available geometrics shape.			N/A	See <a href="#">Section 508 (f)</a> above.
11.4	If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality) and is updated as often as the inaccessible webpage.			N/A	Current site can be made accessible.
12.1	Title each frame to facilitate frame identification and navigation.			N/A	No frames on site.
14.1	Use clear and simple language appropriate for a site's content.		No		<p><b>All pages:</b> use language more appropriate to target audience. Current label abbreviations, for example, may be confusing to users.</p> <p><b>Main Menu:</b> Label graphical buttons and descriptions with language more appropriate to target audience.</p>

WCAG 1.0	Priority 2 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
2.2	Ensure that foreground and background color combinations provide sufficient contrast when viewed by someone having color deficits or when viewed on a black and white screen. [Priority 2 for images, Priority 3 for text].		No		<p><i>Text or diagrams and their background must have a luminosity contrast ratio of at least 5:1 for level 2 conformance, and a luminosity contrast ratio of at least 10:1 for level 3 conformance.</i></p> <p><b>All Pages:</b></p> <ul style="list-style-type: none"> <li>○ The breadcrumb link color fails against the background color: <ul style="list-style-type: none"> <li>• Foreground: #006633</li> <li>• Background: #CCCCFF</li> <li>• <b>Fail</b> (The contrast ratio is: 4.68)</li> </ul> </li> </ul> <p><b>Table Mode:</b></p> <ul style="list-style-type: none"> <li>○ The white text color fails against the gray background color: <ul style="list-style-type: none"> <li>• Foreground: #FFFFFF</li> <li>• Background: #999999</li> <li>• <b>Fail</b> (The contrast ratio is: 2.80)</li> </ul> </li> </ul>
3.1	When an appropriate markup language exists, use markup rather than images to convey information.	Yes			Markup, rather than images, is used to convey information.
3.2	Create documents that validate to published formal grammars.		No		<p>There are numerous instances of invalid code. Also, note that the documents are not being identified correctly as XHTML 1.0 Transitional.</p> <p>Current code reads:</p> <pre>&lt;!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd"&gt; &lt;html&gt;</pre> <p>It should be:</p> <pre>&lt;!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd"&gt; &lt;html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en"&gt;</pre>
3.3	Use style sheets to control layout and presentation.		No		CSS is used to control some presentation, but tables are primarily used for controlling layout. Use style sheets to control layout and presentation.
3.4	Use relative rather than absolute units in markup language attribute values and style sheet property values.	Yes			Relative unites were used for fonts, but tables had absolute, not relative sizing.
3.5	Use header elements to convey document structure and use them according to specification.		No		Very few header elements are used to convey document structure.
3.6	Mark up lists and list items properly.		No		No lists or list items are marked up.
3.7	Mark up quotations. Do not use quotation markup for			N/A	No quotations are used on pages tested.

WCAG 1.0	Priority 2 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
	formatting effects such as indentation.				
6.5	Ensure that dynamic content is accessible or provide an alternative presentation or page.			N/A	No dynamic content on pages tested.
7.2	Until user agents allow users to control blinking, avoid causing content to blink (i.e., change presentation at a regular rate, such as turning on and off).			N/A	No blinking content on pages tested.
7.4	Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.			N/A	No auto-refresh for pages tested.
7.5	Until user agents provide the ability to stop auto-redirect, do not use markup to redirect pages automatically. Instead, configure the server to perform redirects.			N/A	No auto-direct for pages tested.
10.1	Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user.		No		Remote Control opens in a new window, as do several other control boxes, i.e. in the table mode, without informing the user of this change.
10.2	Create explicit associations between labels and form controls and ensure label is properly positioned.		No		There are no labels or IDs given for most form fields. Use label for, and IDs to associate field labels with their associated text box. Use fieldset, and legend tags to group the form content.
11.1	Use W3C technologies when they are available and appropriate for a task and use the latest versions when supported.		No		Site can use CSS or alternative coding for buttons instead of current JavaScript.
11.2	Avoid deprecated features of W3C technologies.		No		Site contains deprecated tags or elements, such as the FONT tag.
12.3	Divide large blocks of information into more manageable groups where natural and appropriate.	Yes			There were no large blocks of information on any of the pages tested, however, <h1> and <h2>, etc., type tags can be very useful to help organize information on the page. E.G. they could be used to organize content on the <a href="#">Navigate Contents, page</a> .
13.1	Clearly identify the target of each link.		No		Navigation links do not have <title>attributes. In-text links are not always clear.
13.2	Provide metadata to add		No		Provide metadata to enhance searching

WCAG 1.0	Priority 2 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
	semantic information to pages and sites.				capabilities.
13.3	Provide information about the general layout of a site (e.g., a site map or table of contents).		No		There is no site map or table of contents provided.
13.4	Use navigation mechanisms in a consistent manner.	Yes			Top navigation is consistent throughout site.
	<b>And if you use tables (Priority 2)</b>				
5.3	Do not use tables for layout unless the table makes sense when linearized. Otherwise, if the table does not make sense, provide an alternative equivalent (which may be a linearized version).	Yes			Tables are used for layout and make sense when linearized on the pages tested.
5.4	If a table is used for layout, do not use any structural markup for the purpose of visual formatting.		No		Structural markup is used for the purpose of visual formatting.
	<b>And if you use frames (Priority 2)</b>				
12.2	Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone.			N/A	No frames on pages tested.
	<b>And if you use forms (Priority 2)</b>				
10.2	Until user agents support explicit associations between labels and form controls, for all form controls with implicitly associated labels, ensure that the label is properly positioned.	Yes			Labels are properly positioned with respect to input fields.
12.4	Associate labels explicitly with their controls.		No		Use label for, and id to associate field labels with their associated text box. Use fieldset, and legend tags to group form content.
	<b>And if you use applets and scripts (Priority 2)</b>				
6.4	For scripts and applets, ensure that event handlers are input device-independent.	Yes			Drop down menus and links work without mouse on pages tested. Ensure that application can be used without mouse (keyboard only) throughout application.
7.3	Until user agents allow users to			N/A	No movement in page content tested.

WCAG 1.0	Priority 2 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
	freeze moving content, avoid movement in pages.				
8.1	Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies [Priority 1 if functionality is important and not presented elsewhere, otherwise Priority 2.]	Yes			Ok on pages tested.
9.2	Ensure that any element that has its own interface can be operated in a device-independent manner.			N/A	No embedded elements in pages tested.
9.3	For scripts, specify logical event handlers rather than device-dependent event handlers.	Yes			Drop down menus work with JavaScript turned off.

WCAG 1.0	Priority 3 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
4.2	Specify the expansion of each abbreviation or acronym in a document where it first occurs.		No		Abbreviations and acronyms (such as "syms") should be noted in context or spelled out, and include appropriate <abbr> or <acronym> markup.
4.3	Identify the primary natural language of a document.		No		Document language not identified.
9.4	Create a logical tab order through links, form controls, and objects.	Yes			Tab order is logical and follows site layout.
9.5	Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls.		No		There are no keyboard shortcuts.
10.5	Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links.		No		Site does not place characters between links. Include a vertical bar, " ", between links so that they don't run together when assistive screen reading technology is being used.
11.3	Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.)		No		Site does not contain a mechanism for transforming content.
13.5	Provide navigation bars to highlight and give access to the navigation mechanism.	Yes			Main navigation areas are clearly marked, although the main menu' navigation could be centralized.
13.6	Group related links, identify the group (for user agents), and, until user agents do so, provide a way to bypass the group.		No		Site does not use link lists and does not provide a link to skip over navigation to main content.
13.7	If search functions are provided, enable different types of searches for different skill levels and preferences.			N/A	Site does not provide a search function.
13.8	Place distinguishing information at the beginning of headings, paragraphs, lists, etc.		No		Remember that AT users may skim the first words of a paragraph for context. Provide subject information at the beginning of sentences as often as possible. Use consistent formatting as well.
13.9	Provide information about document collections (i.e., documents comprising multiple pages).			N/A	Pages tested did not contain information about groups of documents.
13.10	Provide a means to skip over multi-line ASCII art.			N/A	Site does not include ASCII art.

WCAG 1.0	Priority 3 Checkpoints	Yes/ OK	No/ Fix	N/A	Comments
14.2	Supplement text with graphic or auditory presentations where they will facilitate comprehension of the page.			N/A	No content would be supplemented with graphic or auditory presentations where they will facilitate comprehension of the page.
14.3	Create a style of presentation that is consistent across pages.	Yes			Presentation is consistent across pages.
	<b>And if you use images and image maps (Priority 3)</b>				
1.5	Until user agents render text equivalents for client-side image map links, provide redundant text links for each active region of a client-side image map.			N/A	No client-side image maps were tested.
	<b>And if you use tables (Priority 3)</b>				
5.5	Provide summaries for tables.		No		No summaries for tables provided on pages tested.
5.6	Provide abbreviations for header labels.		No		No abbreviations for header labels on pages tested.
10.3	Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current page or some other) for all tables that lay out text in parallel, word-wrapped columns.	Yes			Tables used for layout make sense when linearized on the pages tested.
	<b>And if you use forms (Priority 3)</b>				
10.4	Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas.		No		There are no default, place-holding characters in edit boxes and text areas.

## Summary and Recommendations

Our evaluation of the LON-CAPA application (Course Coordinator Interface) indicates that LON-CAPA fails a number of Section 508 and WCAG 1.0 Priority 1 criteria, despite including a number of techniques to enhance accessibility to persons with disabilities, such as offering an alternate interface for accessibility and fairly consistently using text rather than images to convey information.

Specifically LON-CAPA fails the following Section 508 and WCAG 1.0 Priority 1 criteria:

- Missing or insufficient ALT attribute markup
- Missing table markup, such as TH and ID elements
- Missing form markup, such as LABEL FOR and ID elements
- JavaScript dependent functions

In addition, a variety of changes can be made to enhance accessibility, such as using markup to better associate cells within tables, using headings to group and differentiate information, replacing tables and JavaScript with CSS or ensuring that the JavaScript degrades properly, and correctly structuring forms. In addition to these enhancements we recommend several revisions that will further improve usability for people with disabilities, particularly in the areas of heading and list markup, as well as page structure.

For example, labeling the headings within tables, and using link lists instead of tables to format similar information, such as the main menu, will give users a clearer understanding of relationships among information, as well as assist in the linearization of tables. Also, markup that identifies structural groups of rows (THEAD for repeated table headers, TFOOT for repeated table footers, and TBODY for other groups of rows) and groups of columns (COLGROUP and COL) will further assist users in understanding and navigating through complex data. Labeling table elements with the SCOPE and HEADER attributes can also ensure that future browsers and assistive technologies will be able to select data from a table by filtering on categories.

Also, using LABEL FOR, and IDs to associate field labels with their associated text box, and using FIELDSET, and LEGEND tags to group the form content, will further assist in helping users contextually.

Adding common ACCESSKEYs will improve navigation by providing users with more direct access to frequently-visited destinations. At present there are no accesskeys found on the pages tested; and the addition of accesskeys should be considered. Recommendations for accesskeys are taken from the United Kingdom's *Building In Universal Accessibility + Checklist*, CabinetOffice (May 2002), <http://www.cabinetoffice.gov.uk/e-government/resources/handbook/html/2-4.asp>, recently adopted by IBM for their corporate intranet.

More frequent use of headings, improving heading hierarchy, and placing subjects early in sentences will also facilitate scanning through the site by persons with disabilities. This will be especially useful for blind persons, who surf by listening to content headings. Likewise, including table summaries will also help users navigate through the information.

The contrast levels between background and foreground colors, as well as the text may be difficult for persons with cognitive issues and should be eliminated or minimized.

Please see the specific checkpoints for a number of other items and additional detail.

After more of the site is developed and the accessibility enhancements are made, a review and reevaluation of the production code is recommended to verify that the application is compliant, especially should additional forms and tables be added to the site. Future evaluations are recommended on at least a quarterly basis to ensure on-going compliance.

Furthermore, we recommend that a style guide be developed for course coordinators to help them with creating accessible content, as many of these accessibility issues could occur in faculty-created content areas, despite the best efforts of the LON-CAPA system. A style guide to encourage the creation of accessible content, along with instruction on how to do so, will aid many content creators from repeating many of the accessibility issues witnessed in this evaluation and further facilitate the implementations of the recommendations made throughout.

## References

Souza, R. (2001). *Design accessible sites now*. Forrester Research Report.

Swierenga, S. J. & Walker, J. L. (2005). *Implementing a corporate web accessibility compliance program*. Half-day tutorial at the Usability Professionals' Association conference.

Swierenga, S. J. (2002). *Accessible web site design and usability testing*. Paper and presentation at the Usability Professionals' Association conference.

Thatcher, J., Bohman, P., Burks, M., Henry, S. L., Regan, B., Swierenga, S. J., Urban, M. D., & Waddell, C. D. (2002). *Constructing accessible web sites*. Birmingham, UK: glasshaus. Revised and reprinted by Apress LP in 2003.

# Appendix 1 – Screenshots of the Pages Reviewed

## Main Menu page

[Main Menu](#) [Return to Last Location](#) [Navigate Contents](#) [Course Documents](#) [Groups](#) [Launch Remote Control](#) [Roles](#) [Help](#) [Exit](#)

**Main Menu** UAC Subject13  
Course Coordinator  
Usability Study - Faculty 13

<b>ROLES</b>	Switch to another user role
<b>DOCS</b>	Edit and view documents included in this course
<b>NAV</b>	Navigate the table of contents for this course
<b>SPRS</b>	View calculated grades (Spreadsheet)
<b>CHRT</b>	View the course assessment progress chart
<b>STAT</b>	View course assessment statistics
<b>ENRL</b>	Manage student enrollment
<b>CUSR</b>	Create a user or modify the roles and privileges of a user
<b>PARM</b>	Modify parameter settings for resources and the course
<b>RES</b>	Browse published resources
<b>NEW</b>	What's new?
<b>VBKM</b>	Use or edit my bookmark collection
<b>CLDR</b>	Course announcements and my calendar
<b>COM</b>	Send and receive messages
<b>CHAT</b>	Enter the chatroom for the course
<b>GRPS</b>	Edit any group in the course
<b>PORT</b>	Enter my portfolio space
<b>SRCH</b>	Search the database of published resources
<b>PREF</b>	Set my user preferences
<b>EXIT</b>	Exit LON-CAPA

## Navigate Contents page

[Main Menu](#) [Return to Last Location](#) [Navigate Contents](#) [Course Documents](#) [Groups](#) [Launch Remote Control](#) [Roles](#) [Help](#) [Exit](#)

### Navigate Course Contents

UAC Subject13  
Course Coordinator  
Usability Study - Faculty 13

Select Action  Sort by:

[Syllabus](#)

Homework Set 1

<a href="#">problem 1</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 2</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 3</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 4</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 5</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 6</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 7</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 8</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 9</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">problem 10</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)

Homework Set 2

<a href="#">Unit Names and Symbols</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">Not a fish</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">Smile</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">Practice Algebra</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">Matching names to symbols</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">Distance Travelled</a>	Was due by Wednesday, May 17 at 09:00 pm (EDT)

## Navigate Contents page continued

<a href="#">?</a> <a href="#">Distance Travelled</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">?</a> <a href="#">Not a bird</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">?</a> <a href="#">Smile Matching</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">?</a> <a href="#">Unit names</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
<a href="#">?</a> <a href="#">Not a mammal</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
 Homework Set 3		
<a href="#">?</a> <a href="#">One-dimensional motion</a> 		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">?</a> <a href="#">Free Fall Acceleration</a>		
<a href="#">(Part: 16)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">(Part: 17)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">(Part: 18)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">?</a> <a href="#">One-dimensional Gravitational motion</a>		
<a href="#">(Part: 11)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">(Part: 13)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">?</a> <a href="#">Take off</a>		
<a href="#">(Part: 14)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">(Part: 15)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">?</a> <a href="#">Boat Crossing a River</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
<a href="#">?</a> <a href="#">Average speed</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
 Lecture Slides		
<a href="#">Lecture 1</a>		
<a href="#">Lecture 2</a>		
 Quiz Scores		

## Navigate Contents page continued

	<a href="#">Unit names</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
	<a href="#">Not a mammal</a>		Was due by Wednesday, May 17 at 09:00 pm (EDT)
	Homework Set 3		
	<a href="#">One-dimensional motion</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">Free Fall Acceleration</a>		
	<a href="#">(Part: 16)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">(Part: 17)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">(Part: 18)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">One-dimensional Gravitational motion</a>		
	<a href="#">(Part: 11)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">(Part: 13)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">Take off</a>		
	<a href="#">(Part: 14)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">(Part: 15)</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">Boat Crossing a River</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	<a href="#">Average speed</a>		Was due by Thursday, May 25 at 05:00 pm (EDT)
	Lecture Slides		
	<a href="#">Lecture 1</a>		
	<a href="#">Lecture 2</a>		
	Quiz Scores		
	<a href="#">Quiz 1</a>		Open, no due date
	<a href="#">Quiz 2</a>		Open, no due date
	<a href="#">Quiz 3</a>		Open, no due date

# Course Documents page

[Main Menu](#) [Return to Last Location](#) [Navigate Contents](#) [Course Documents](#) [Groups](#) [Launch Remote Control](#) [Roles](#) [Help](#) [Exit](#)

**Course Documents** [UAC Subject13](#)  
Course Coordinator  
Usability Study - Faculty 13

[Verify Content](#) [Check/Set Resource Versions](#) [Export Course to IMS](#) [List Syms](#)

[Editing the Table of Contents for your Course](#)

### Main Course Documents

(1)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Syllabus	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	
(2)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Homework Set 1	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	Randomly Pick: <input type="text"/> <a href="#">Store</a>
(3)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Homework Set 2	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	Randomly Pick: <input type="text"/> <a href="#">Store</a>
(4)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Homework Set 3	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	Randomly Pick: <input type="text"/> <a href="#">Store</a>
(5)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Lecture Slides	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	Randomly Pick: <input type="text"/> <a href="#">Store</a>
(6)	<a href="#">Remove</a> <a href="#">Cut</a> <a href="#">Rename</a> <a href="#">Copy</a>	Quiz Scores	<input type="checkbox"/> Hidden	<input type="checkbox"/> URL hidden	Randomly Pick: <input type="text"/> <a href="#">Store</a>

Upload a new main course document	Import a document	Special documents
<p>File: <input type="text"/> <a href="#">Browse...</a></p> <p>Title: <input type="text"/></p> <p>If HTML file, upload embedded images/multimedia files? <input type="checkbox"/></p> <p><a href="#">Upload Document</a></p>	<p>Published documents</p> <p><a href="#">Search</a></p> <p><a href="#">Import</a></p> <p><a href="#">Import Bookmarks</a></p> <hr/> <p>All documents out of a published map into this folder</p> <p><input type="text"/></p> <p><a href="#">Select Map</a> <a href="#">Load Map</a></p> <hr/> <p><a href="#">Recover Deleted Resources</a></p> <hr/> <p><a href="#">External Resource</a></p> <p><a href="#">Import IMS package</a></p>	<p><a href="#">New Folder</a></p> <p><a href="#">New Composite Page</a></p> <hr/> <p><a href="#">Syllabus</a></p> <p><a href="#">Navigate Contents</a></p> <p><a href="#">Simple Page</a></p> <p><a href="#">Simple Problem</a></p> <p><a href="#">Drop Box</a></p> <p><a href="#">Score Upload Form</a></p> <p><a href="#">Bulletin Board</a></p> <p><a href="#">My Personal Info</a></p> <p><a href="#">About User</a></p>

## Course Documents page continued

(6) Remove Cut Rename Copy Quiz Scores Hidden  URL hidden Randomly Pick: Store

Upload a new main course document	Import a document	Special documents
<p>File: <input type="text"/> Browse...</p> <p>Title: <input type="text"/></p> <p>If HTML file, upload embedded images/multimedia files? <input type="checkbox"/></p> <p>Upload Document ?</p>	<p>Published documents</p> <p>Search Import ? Import Bookmarks</p> <p>All documents out of a published map into this folder</p> <p><input type="text"/></p> <p>Select Map Load Map ?</p> <p>Recover Deleted Resources</p> <p>External Resource ? Import IMS package</p>	<p>New Folder ? New Composite Page ?</p> <p>Syllabus ? Navigate Contents ? Simple Page ? Simple Problem ? Drop Box Score Upload Form ? Bulletin Board ? My Personal Info ? About User</p>

### Supplemental Course Documents

Currently no documents.

Upload a new supplemental course document	Special documents
<p><input type="text"/> Browse...</p> <p>If HTML file, upload embedded images/multimedia files? <input type="checkbox"/></p> <p>Comment: <input type="text"/></p> <p>Upload Document ?</p>	<p>New Folder ? External Resource ?</p> <p>Syllabus ? My Personal Info ?</p>

# Model Homework Problem page ("Smile" Clickable Image Problem)

[Main Menu](#) [Navigate Contents](#) [Course Documents](#) [Groups](#) [Launch Remote Control](#) [Roles](#) [Help](#) [Exit](#)

Usability Study - Faculty 13, Homework Set 1: problem 2

 Go to the previous resource in the course sequence

 Go to the next resource in the course sequence

 Show catalog information

 Modify parameter settings for this resource

 Modify user grades for this assessment resource

 Provide feedback messages or contribute to the course discussion about this resource

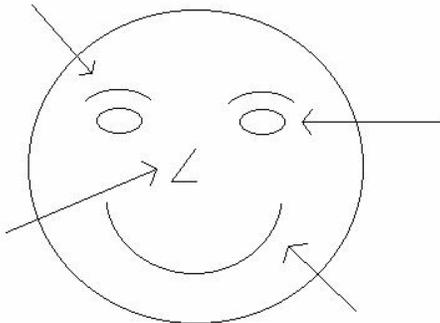
 Prepare a printable document

 Provide my evaluation of this resource

 Set a bookmark for this resource

 Make notes and annotations about this resource

Consider the image below. Click on the mouth



[Submit Answer](#) Tries 0/99



## Model Homework Problem page ("Smile" Clickable Image Problem) continued



Go to the previous resource in the course sequence

Go to the next resource in the course sequence



Provide my evaluation of this resource



Modify user grades for this assessment resource



Show catalog information



Modify parameter settings for this resource



Provide feedback messages or contribute to the course discussion about this resource



Prepare a printable document

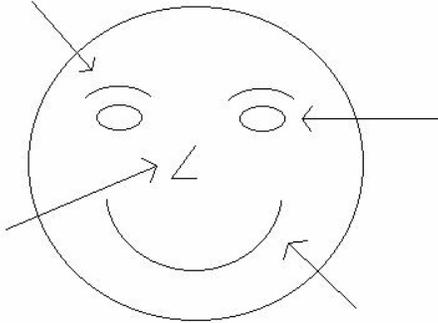


Set a bookmark for this resource



Make notes and annotations about this resource

Consider the image below. Click on the mouth



Submit Answer

Tries 0/99



Post Discussion



Send Message



Table Mode in PARM (also PPRM from Resource page) continued

Assessment URL and Title	Type	Enclosing Map or Folder	Part	Parameter Name	general	for Enclosing Map or Folder	default	from Enclosing Map or Folder	for Resource	in Effect	value (uac13faculty at msu)
msu / felicia / usability / fish.problem <b>problem 1</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / felicia / usability / click-on.problem <b>problem 2</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum	*	*			*		

Table Mode in PARM (also PPRM from Resource page) continued

			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / Felicia / usability / formula.problem <b>problem 3</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / Felicia / usability / matching.problem <b>problem 4</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		

Table Mode in PARM (also PPRM from Resource page) continued

problem 4			0	[Part: 0] (answerdate)	-	-			-		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / felicia / usability / numerical.problem	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / felicia / usability / option.problem	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date	*	*			*		



Table Mode in PARM (also PPRM from Resource page) continued

msu / felicia / usability / randomlabel.problem <b>problem 8</b>	problem	Homework Set 1	0	Problem Due Date [Part: 0] (duedate)	*	<u>Wed May 17 21:00:00 2006</u>			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
msu / felicia / usability / string.problem <b>problem 9</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)		<u>Wed May 17 08:00:00 2006</u>			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	<u>Wed May 17 21:00:00 2006</u>			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*		
			0	Weight [Part: 0] (weight)	*	*			*		1
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99
			0	Problem Opening Date [Part: 0] (opendate)		<u>Wed May 17 08:00:00 2006</u>			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006

Table Mode in PARM (also PPRM from Resource page) continued

msu / felicia / usability / string.problem <b>problem 9</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*	-			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006	
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*			
			0	Weight [Part: 0] (weight)	*	*			*		1	
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99	
msu / felicia / usability / maximal.problem <b>problem 10</b>	problem	Homework Set 1	0	Problem Opening Date [Part: 0] (opendate)	Wed May 17 08:00:00 2006	*	-			*	Wed May 17 08:00:00 2006	Wed May 17 08:00:00 2006
			0	Problem Due Date [Part: 0] (duedate)	*	Wed May 17 21:00:00 2006			*	Wed May 17 21:00:00 2006	Wed May 17 21:00:00 2006	
			0	Problem Answer Date [Part: 0] (answerdate)	*	*			*			
			0	Weight [Part: 0] (weight)	*	*			*		1	
			0	Maximum Number of Tries [Part: 0] (maxtries)	*	*			*		99	

## Grading (PGRD) page

<a href="#">Main Menu</a>	<a href="#">Return to Last Location</a>	<a href="#">Navigate Contents</a>	<a href="#">Course Documents</a>	<a href="#">Groups</a>	<a href="#">Launch Remote Control</a>	<a href="#">Roles</a>	<a href="#">Help</a> <a href="#">Exit</a>
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### Grading

UAC Subject13  
Course Coordinator  
Usability Study - Faculty 13

#### Manual Grading/View Submission

**Current Resource:** problem 6  
**Part:** 0 11    **Type:** option

**Select a Grading/Viewing Option**

Select Section:  Student Status:

**Current Resource:** For one or more students

**Current Resource:** For all students in selected section or course

The **complete** set/page/sequence: For one student

<input type="button" value="Upload"/>	scores from file
<input type="button" value="Grade"/>	scantron forms
<input type="button" value="Verify"/>	receipt: 153- <input type="text"/>
<input type="button" value="Manage"/>	access times.
<input type="button" value="View"/>	saved CODEs.

## Parameter Manager (PARM) page

[Main Menu](#) [Return to Last Location](#) [Navigate Contents](#) [Course Documents](#) [Groups](#) [Launch Remote Control](#) [Roles](#) [Help](#) [Exit](#)

### Parameter Manager

Usability Study - Faculty 13->Parameter Manager

UAC Subject13  
Course Coordinator  
Usability Study - Faculty 13  
**Parameter Manager** ?

#### Settings for Your Course

- [Set Course Environment](#) ?
- [Set Portfolio Metadata](#)
- [Manage Course Slots](#)
- [Set Parameter Setting Default Actions](#)

#### New and Existing Parameter Settings for Your Resources

- [Set/Modify Resource Parameters - Helper Mode](#) ?
- [Set/Modify Resource Parameters - Overview Mode](#) ?
- [Set/Modify Resource Parameters - Table Mode](#) ?

#### Existing Parameter Settings for Your Resources

- [Modify Resource Parameters - Overview Mode](#) ?
- [Parameter Change Log and Course Blog Posting/User Notification](#)