Evaluation of the Library's Digital Collections Web Site

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Usability Testing of the Western Waters Digital Library Web Site

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Executive Summary

The Colorado State University (CSU) Libraries Digital Collections Web site provides access to the CSU Libraries Digital Collections. The Western Waters Digital Library (WWDL) Web site is the product of a collaborative effort among 12 university libraries in eight western states. The Web sites provide a way for CSU faculty, students and staff conducting research to access primary documents without having to physically enter the library building or handle the documents, saving the researchers time, and reducing wear on the documents. The purpose of this study is to evaluate these Web sites.

Eighteen participants were asked to complete 11 tasks on each Web site. At the end of the session, participants completed a post-usability questionnaire. Although it needs some minor revisions, overall, participants liked the Digital Collections Web site. The photos in the Digital Collections received the most consistently positive feedback from participants. Participants also liked the Help page and the Advanced Search page.

Overall, approximately 27.8% of participants were neutral when responding whether they would use the Digital Collections Web site again, while 50% said they would use the site again. Sixty-seven percent of participants tended to feel lost when using the Web site, and 56% became overwhelmed.

The most challenging task in Digital Collection was task number 11 with only 59% of the participants completing this task. This task asked participants to insert items into "My favorites." On the WWDL Web site, the most difficult task was task number 7, on finding information on "Technical Details," with only 69 percent completing this task.

The results of the heuristic evaluation of Colorado State University's Digital Collections Web site indicated that the site does not maintain visual consistency between

pages, lacks a clear link or button to go back to the Digital Collections site, and does not

provide adequate help in searching for specific information. Also, the site does not

provide information on the process of how the Digital Collections were created, including

purpose and criteria for selecting collections for digitization.

In conclusion, the usability testing indicated participants were positive and

generally like the Web site. The current study was limited to the students of CSU and

cannot be generalized to the usability issues for other users who may access these Web

sites. Both usability testing and heuristic evaluation identified areas for potential future

efforts to improve these Web sites.

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Introduction

Digital Collections Web site

The Colorado State University (CSU) Libraries Digital Collections Web site provides access to the CSU Libraries Digital Collections. Each digital collection is a group of digitized primary research documents from CSU Libraries sources. The Web site provides a way for CSU faculty, students and staff conducting research to access primary documents without having to physically enter the library building or handle the documents, saving the researchers time and reducing wear on the documents.

Difficulties users encounter on the Digital Collections Web site may impede research and may indirectly increase the traffic in the library and the workload of library personnel. Researchers disinclined to search digital documents may resort to searching physical documents, increasing wear on rare and valuable documents.

The following report evaluates the usability of the CSU Libraries Digital Collections Web site, based on the results of a heuristic evaluation and usability testing to determine areas for potential improvement.
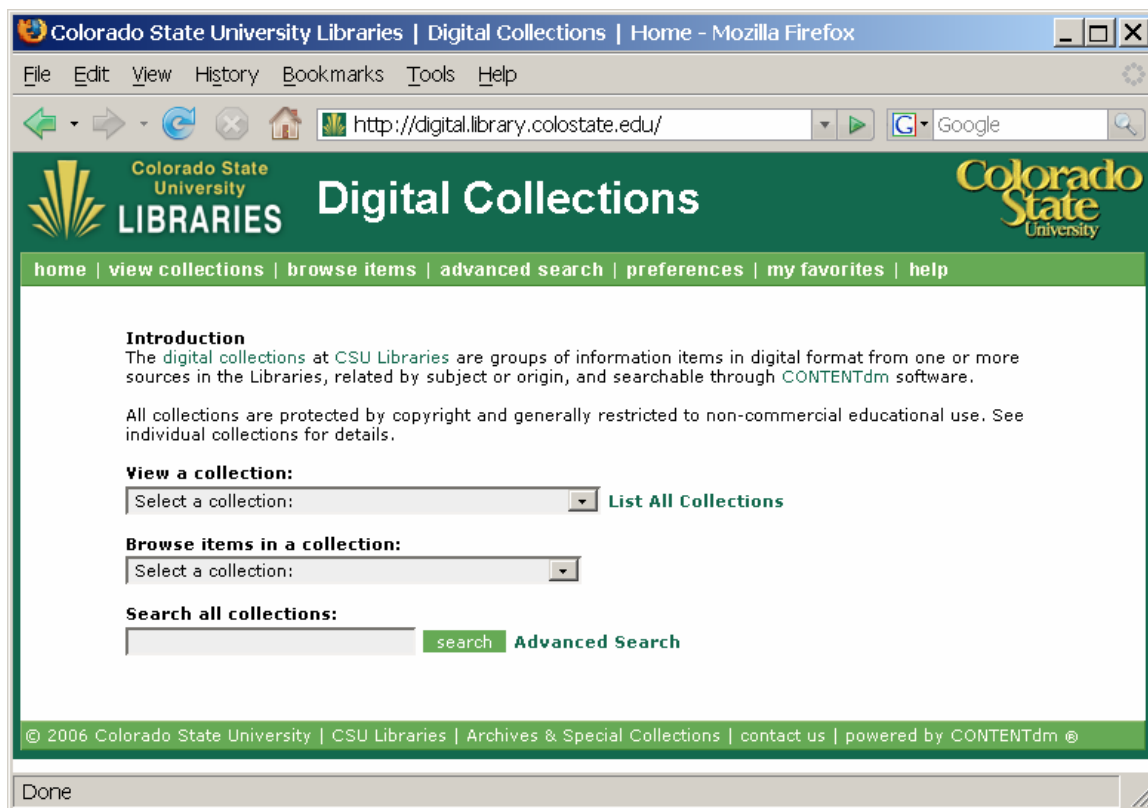
Figure 1. Screen Shot of Digital Collection Web site

Western Waters Digital Library Web site

The Western Waters Digital Library (WWDL) Web site is the product of a collaborative effort among 12 university libraries in eight western states. The Web site provides access to digitized materials from participating materials, including materials from the Colorado's Waters Digital Archive at CSU Libraries. The WWDL allows users to search among materials housed by participating libraries, though access to the objects themselves is provided by the individual libraries.

The WWDL Web site provides a centralized resource for researchers to access information about water in the West from numerous sources. Difficulty with the site could impede research and impair access to valuable information resources. The following report evaluates the usability of the WWDL Web site based on the results of usability testing to determine areas for potential improvement.

Figure 2. Screen Shot of Western Waters Digital Library Web site

Audiences

While users of the Digital Collections Web site will mostly be members of the

CSU community, and users of the WWDL Web site will be members of numerous

different communities, the two groups of users should not differ in other important

respects. Users will be researchers – university faculty, staff and students – and will be

familiar with the Internet, Web sites, and various research tools and information

technologies. Users will be from diverse socioeconomic backgrounds and will vary

considerably in age, from about 20 to 65 years old. However, most users should have more experience using computers and the Internet than average.

Objectives

The purpose of this study is to evaluate the usability of the CSU Libraries Digital Collections Web site and the WWDL Web site. To achieve this purpose, the study addressed the following research questions with respect to both Web sites:

- What tasks are easy for users?

- What tasks are difficult for users?

- What do users like about the site?

- What do users dislike about the site?

- How well does the design of the site conform to usability guidelines?

Methods

Heuristic Evaluation

The U.S. Department of Health and Human Services Research-Based Web Design and Usability Guidelines were used to conduct a heuristic evaluation of the CSU Libraries Digital Collections Web site. The set consisted of 209 guidelines, each graded on its relative importance and the strength of the empirical evidence supporting it.

JT 661 class members assessed the usability of the Digital Collections Web site against the guidelines and compiled a list of areas of potential improvement based on that assessment.

Usability Testing

    Participants. 18 participants were recruited for usability testing through CSU classes and research team members' personal contacts. Demographic data for one participant was not recorded. Of the remaining 17 participants, 12 were female and five were male. Five participants were freshmen, four were sophomores, five were juniors, one was a senior, one was a graduate student, and one was in a special program. Ages ranged from 18 to 29, though 14 were 18 to 21 years old.

    Testing. Usability testing was conducted in the usability testing facility in the Clark C building at CSU. When participants arrived, they signed a consent form, received a $20 gift certificate for the CSU bookstore as an honorarium, and signed an honorarium receipt.

    Participants were then given a set of 11 tasks to complete on the Digital Collections Web site and a set of 11 tasks to complete on the WWDL Web site. The tasks were designed to simulate tasks users of the sites would actually perform; they were also designed to incorporate as many features and areas of each site as possible.

    Participants were asked to speak aloud as they completed tasks while JT 661 students recorded observations and times for each task. Participants completed tasks sequentially, with minimal assistance, and wrote their solutions to tasks as they proceeded. Usability sessions were also recorded on video tapes.

    At the end of the session, participants completed a six-part usability questionnaire developed by Professor Don Zimmerman. The first part of the questionnaire asked six open-ended questions about the Web sites. The second part comprised 34 seven-point Likert-type items about the participants' general reactions to the Web site. The third section comprised 31 seven-point Likert-type items about specific aspects and features of

the Digital Collections Web site. The fourth section gathered information about participants' past usage of the CSU Libraries Web site and the Digital Collections Web site. The fifth section asked participants about their level of experience with computers. The sixth section gathered background information about participants. Participants were then given a debriefing form before they were released.

Data Analysis. Average completion times and rates of completion for usability testing tasks were calculated in Microsoft Excel spreadsheets. Data from usability questionnaires were analyzed using the Statistical Package for the Social Sciences. Means and standard deviations were calculated for each Likert-type item, as were percentages for each response category. These descriptive statistics were reviewed by members of the research team for trends and saliencies. This analysis was combined with results of the heuristic evaluation to draw conclusions and make recommendations for improved usability.

Results

Summary

The results of usability testing on the CSU Libraries Digital Collections Web site and the WWDL Web site were generally positive. Participants were able to complete most tasks with minimal assistance, and they reported generally positive impressions of the sites. Participants had particularly positive opinions of the photos on the sites and of the "Help" and "Advanced Search" pages. Although most participants thought a "My Favorites" feature would be useful, most also found the current "My Favorites" feature difficult to use. Participants also had difficulty using the "Preferences" feature and most reported feeling lost and overwhelmed.

Times for 8 of 11 Digital Collections Web site tasks exceeded one minute, suggesting participants had difficultly finding information. Task times on the WWDL Web site were much lower. However, differences in the way observers recorded task times may have influenced these results. Observers may have started timing when a participant began reading a question or when the participant finished reading a question; and observers may have stopped timing when a participant found the answer to a question or when the participant finished writing the answer to the question. While these discrepancies may have strongly influenced times recorded for individual participants by individual observers, averages across tasks and observers help mitigate this potential bias.

Participants' Computer Use

The participants' experience with years of computer use is ranked in descending orders as follows: using a personal computer; using the WWW; installing software; filling out online applications; installing Flash updates; downloading Adobe Acrobat software; and downloading .pdf files (see Table 1). The area with least number of years of experience was with the installation of hardware. The level of computer experience was assessed using seven-point Likert scales with score of one being no computer experience and seven indicating a great deal of computer experience. The participants appear to have good experience using the World Wide Web (5.80$\pm$0.94), since this area was rated the highest among the eight areas of computer use and had the smallest standard deviation (see Table 2). The areas where participants had fair to good level of computer experience were with using personal computer and filling online forms. The following areas were rated at approximately 4 out of 7 point Likert scale: personally downloading Adobe Acrobat software; downloading .pdf files; and installation of

software. The areas that scored on the lowest level of computer experience were

installing Flash updates and installing hardware. Some (3-5) participants did not

complete this section of post-usability questionnaire, which may have introduced some

bias into the results.

Table 1: Usability Participants' Computer Experience – Years

		Percentage	
		n	Mean Years $\pm$ SD
Using a personal computer		17	10.71 $\pm$ 5.11
Using the WWW		17	8.88 $\pm$ 2.40
Personally downloading Adobe Acrobat software		17	3.24 $\pm$ 3.40
Downloading .pdf files		17	3.47 $\pm$ 2.32
Installing software		16	5.31 $\pm$ 4.25
Installing hardware		14	2.43 $\pm$ 1.87
Filling out applications/ forms online		17	4.24 $\pm$ 2.49
Installing Flash updates		14	3.86 $\pm$ 3.51

Table 2: Usability Participants' Computer Experience

		None						A Great Deal	
	n	1	2	3	4	5	6	7	Mean ± SD
Using a personal computer	15			6.7	6.7	46.7	13.3	26.7	5.47 ± 1.19
Using the WWW	15					53.3	13.3	33.3	5.80 ± 0.94
Personally downloading Adobe Acrobat software	14	14.3	7.1	14.3	7.1	35.7	21.4		4.07 ± 1.77
Downloading .pdf files	14	7.1	7.1	7.1	28.6	21.4		28.6	4.64 ± 1.91
Installing software	13	15.4	7.7	7.7	7.7	15.4	30.8	15.4	4.54 ± 2.15
Installing hardware	14	28.6	14.3	14.3	21.4	21.4			2.93 ± 1.59
Filling out applications/ forms online	15		6.7		13.3	33.3	26.7	20.0	5.33 ± 1.34
Installing Flash updates	13	23.1		23.1	23.1	7.7	23.1		3.62 ± 1.85

Digital Collections Usability Task Performance

All participants successfully completed task 1, on finding the Digital Collection site from CSU Libraries Home Page, and task 7, on obtaining guidance on how to use the Digital Collections site. Participants completed task 7 in the shortest average time (38 seconds).

Task 6 took the longest average time (2 minutes 13 seconds), and only 78% of the participants completed it. This task required participants to use the "Preferences" section to make changes to Digital Collections settings, but users did not immediately link changing the settings to the "Preferences" section and took time to navigate to various

sections of the site. Also, the text of the task in the usability protocol was long and asked

participants to complete three other tasks that were time consuming.

Task 11 proved to be the most challenging, with only 59% of the participants

completing it. This task involved inserting items from two of the collections into the

"My Favorites" section. Ninety-four percent of the participants were successful in

obtaining information on "Help" function (task 8) and reporting a problem with the

Digital Collection site.

Participants averaged more than a minute completing 8 of 11 tasks, indicating that

they had some difficulty finding information quickly. Differences in the manner in which

observers recorded these times may have influenced the results (see Table 3).

Table 3. Digital Collection Usability Tasks Completion and Average Times (n=18)

Task	Description	% of Participants completing task	Average time required to complete task in min:sec
1	Start at the CSU Libraries Home Page and find the Digital Collections site. How many collections are available in CSU Digital Collections? What topics are included? What kinds of materials are provided in the collections?	100%	1:51
2	If you had a job as a writer for a magazine, could you use the images from the Digital Collection? What guidance does the CSU Digital Collection Web site give you?	76%	1:36
3	What organization on the site has been involved in Colorado's flower industry? Which of the collections would you use?	88%	1:11
4	If you wanted to find images, such as photographs, drawings, and other illustrations in the collections, how would you do so? Please show us by reviewing one of the collections.	93%	1:40
5	If you wanted to find information about water and animals in the collections, how would you find that information?	78%	1:24
6	Assume you would like to change how the Digital Collection looks on your computer. Using the Digital Collection functions—not your browser, determine how you could make changes using the Digital Collections settings. Answer the following questions, but do not make the changes. What changes can you make? Please tell us how you would go about making the changes? Change the display of 100 images to a table with the image, title and subject.	78%	2:13
7	If you couldn't figure out how to use the Digital Collections, where would you find an overview giving you general guidance?	100%	:38
8	What directions does the Help function provide?	94%	:44
9	Assume you're having a problem and need to contact the Libraries about it. How would you send a message to the Libraries about you problem with the Digital Collections site? Find a page that allows you to contact the Libraries.	94%	:58
10	Assume you would like to know about the gestation period of the Asian false vampire bat that's pictured in the Garst Wildlife Photographic collection. Find and report that information.	83%	1:41
11	Assume you will be using the Digital Collections site frequently, and would like to save items that you would use frequently? Insert items from two of the collections into My Favorites.	59%	1:44

Western Waters Digital Library Usability Task Performance

Participants were 100% successful with task 9 on finding the number of collections in the WWDL. The second task that most participants completed (92%) was on conducting an "Advanced Search" using a specific word and search criteria (task # 8). The most difficult task on this site was task 7 with only 69% of the participants correctly completing it. This task asked participants to find the page with information on "Technical Details."

Not all participants completed all tasks because of time constraints. The varying speed with which participants were able to complete tasks, some scheduling complications, and concerns about participant fatigue made it impossible for some participants to complete the usability protocol. Differences in the manner in which observers recorded task times may have influenced the results. However, average times for 6 of 11 tasks were under 1 minute, and the average times for all tasks were under 1.5 minutes, suggesting that users had only low to moderate difficulty finding information on the site (see Table 3).

Table 4. Western Waters Library Usability Tasks Completion and Average Times (n=17)

Task	Description	% of Participants completing task	Average time required to complete task in min:sec
1	What grant funded the Western Waters Web site? Digital Library:	88%	1:28
2	Assume you are a researcher in New Mexico, and you want to know if your institution has participated in developing the Western Waters Digital Library. What institution(s) from New Mexico have participated in developing the Western Waters Digital Library?	82%	1:07
3	Search the Western Waters Digital Library for "**Columbia River**" in the **title**. How many items have Columbia River in the title?	76%	1:10
4	Next search the Western Waters Digital Library for ANY of the words "Cloud Water" in the subject.	82%	:55
5	Name two collections contained in the Colorado River Basin collection?	75%	1:11
6	Search the "Western Waters Digital Library" for the term "Whaling". How many items do you find?	88%	:46
7	On what page of the Western Waters Digital Library do you find information on "Technical Details"?	69%	:58
8	Conduct an "Advanced Search" from the Western Waters Digital Library using the words "Colorado Region" and using "selected fields" as search criteria. How many **items** do you find with Colorado Region in the title?	92%	:53
9	How many collections are in the Western Waters Digital Library? Name them.	100%	:45
10	What page of the Western Waters Digital Library contains links to other water Web sites about water resources?	86%	:36
11	Conduct a search for **images** using the word "**fishing**." What is the 15th image returned by the search?	80%	1:16

Usability Questionnaire Statistical Results

While participants reported using the CSU library Web site relatively frequently

(M = 5.12 $\pm$ 1.73 on a 1 to 7 scale where 1= Not at all to 7 = Very frequently) and they

rated its usefulness highly (M = 5.12 $\pm$ 0.93 on a 1 to 7 scale where 1= not at useful to 7

= very useful), most of the participants had not used the Digital Collections Web site (n=

16). Those who had used it did not rate it highly (M=2.50 $\pm$ 1.92, on a 1 to 7 scale where

1= not at useful to 7 = very useful). Thus, for most participants, their first use of the Web

site occurred during the usability testing. Because the mean ratings for several items were

relatively neutral (e.g. M = 3.5 $\pm$ 1.5), the narrative reports percentages to provide

insights into participants' responses. When calculating the percentages, participants who

answered either 1-3 or 5-7 were totaled. Participants who answered 4 were considered

neutral and were not added to the reported percentages.

Overall, the results of the usability testing were positive, and users generally liked

the Web site. The photos in the Digital Collections received the most consistently

positive feedback from participants. Participants reported that the photos in the

collections make it attractive (M = 5.50$\pm$.857) and interesting (M = 5.67$\pm$.767). For some

participants, the "My Favorites" feature created problems (see Table 4). Although 71% of

the participants reported that a "My Favorites" function would be helpful, 55.5% found

the current "My Favorites" hard to use and hard to understand (see Table 4).

Approximately 56% of participants found the site confusing and 50% became frustrated

when using the Web site. Sixty-seven percent of participants also tended to feel lost when

using the Web site and 56% felt overwhelmed while using the Web site.

Participants liked the "Help" page, "Advanced Search" page, and the photos (see

Table 7, Table 8, Table 9, respectively). They also found the help feature easy to use (M

= 5.78±1.215) and the help feature useful (M = 5.72±1.074). They found the "Advanced

Search" function easy to use (M = 6.33±.97) and helpful (M = 6±1.414).

Overall, approximately 27.8% of participants were neutral when responding that

they would use the Digital Collections page again, while 50% said that they would use

the digital collections again. Although the site needs some minor revisions, overall,

participants liked the Digital Collections Web site (see Tables 5-10)

Table 5: Web Site Satisfaction Survey Results: Section 2, Questions 1-18

| | | Percentage | | | | | | | |
| | | Strongly disagree | | | | | Strongly agree | | |
	n	1	2	3	4	5	6	7	Mean ± SD
Satisfied with experience	18			11.1	27.8	50.0	5.6	5.6	4.67 ± 0.97
Links hard to understand	18		44.4	16.7	27.8	11.1			3.06 ± 1.11
Easy to correct errors	18			11.1	11.1	44.4	22.2	11.1	5.11 ± 1.13
Diagrams and graphics enhanced Web site	17		11.8		23.5	17.6	41.2	5.9	4.94 ± 1.44
Text has too much info	18	11.1	11.1	16.7	33.3	27.8			3.56 ± 1.34
Site navigation bar helpful	9			22.2	33.3	33.3		11.1	4.44 ± 1.24
Words on screen legible	18			16.7	5.6	22.2	38.9	16.7	5.33 ± 1.33
Site confusing to use	18		33.3	22.2	11.1	27.8	5.6		3.50 ± 1.38
Information easy to understand	18			5.6	16.7	38.9	27.8	11.1	5.22 ± 1.06
Site layout easy to follow	18		5.6	5.6	38.9	27.8	16.7	5.6	4.61 ± 1.20
Never felt lost using site	18	11.1	16.7	38.9	11.1	11.1	5.6	5.6	3.33 ± 1.16
Felt overwhelmed	18	16.7	16.7	22.2	22.2	11.1	5.6	5.6	3.33 ± 1.72
Made few errors	18	5.6	5.6	5.6	27.8	22.2	16.7	16.7	4.72 ± 1.67
Pages loaded quickly	18			5.6	5.6	5.6	27.8	55.6	6.22 ± 1.67
Site very easy to use	18		5.6	11.1	22.2	44.4	5.6	11.1	4.67 ± 1.29
Narrative easy to understand	16	6.3		18.8	31.3	18.8	25.0		4.31 ± 1.40
Not frustrated using site	18	11.1	11.1	27.8	22.2	22.2		5.6	3.56 ± 1.54
Site well-written	18		5.6		27.8	33.3	22.2	11.1	5.00 ± 1.24

Table 6: Web Site Satisfaction Survey Results: Section 2, Questions 19-34

		Strongly disagree					Strongly agree		
	n	1	2	3	4	5	6	7	Mean ± SD
Not interesting to use	18	5.6		27.8	22.2	27.8	11.1	5.6	4.22 ± 1.44
Site has too much info in .pdf files	11	27.3	18.2	9.1	27.3	9.1		9.1	3.09 ± 1.92
I prefer to print and then read web pages	18	38.9	33.3	5.6	11.1	5.6		5.6	2.33 ± 1.68
Design of links inconsistent	18	27.8	33.3	22.2	5.6	5.6	5.6		2.44 ± 1.42
Font (typeface) hard to read	18	27.8	44.4	16.7	11.1				2.11 ± 0.96
Font (typeface) too small	18	27.8	27.8	16.7	16.7		5.6	5.6	2.72 ± 1.74
I could easily find the info I needed	17		11.8	23.5	23.5	29.4	11.8		4.06 ± 1.25
Site design is attractive	18	5.6	11.1	11.1	27.8	22.2	16.7	5.6	4.22 ± 1.59
The colors are pleasing	16		18.8	6.3	37.5	18.8	6.3	12.5	4.25 ± 1.57
Prefer read online rather than download	17	5.9	5.9	5.9	11.8	23.5	11.8	35.3	5.18 ± 1.88
Printing pages was easy	2					50.0		50.0	6.00 ± 1.41
Text (labels) of links helpful	17				41.2	35.5	5.9	17.6	5.00 ± 1.12
Prefer links in left-hand column of page	16	12.5	6.3	6.3	31.3	6.3	12.5	25.0	4.50 ± 2.07
Prefer links across top of page	18	11.1	11.1	5.6	22.2	16.7	16.7	16.7	4.39 ± 1.98
Prefer links on left and top of page	17	5.9	11.8	17.6	35.3	5.9	5.9	17.6	4.12 ± 1.80

Table 7. Web Site Satisfaction Survey Results: Section 3, Questions 1-10

| | | Percentage | | | | | | | |
| | | Strongly disagree | | | | | Strongly agree | | |
	n	1	2	3	4	5	6	7	Mean ± SD
Help feature easy to use	18			11.1	5.6	22.2	33.3	27.8	5.61 ± 1.29
Help feature easy to understand	18			11.1		16.7	44.4	27.8	5.78 ± 1.22
Help feature useful	18			5.6	5.6	22.2	44.4	22.2	5.72 ± 1.07
Browse feature easy to use	16			6.3	12.5	18.8	43.8	18.8	5.56 ± 1.53
Browse feature easy to understand	16			12.5	12.5	25.0	37.5	12.5	5.25 ± 1.23
Zoom and pan feature easy to use	3				33.3	66.7			4.67 ± 0.58
Zoom and pan feature helpful	3				66.7			33.3	5.00 ± 1.73
Info below items (metadata) easy to find	13				15.4	61.5	7.7	15.4	5.23 ± 0.93
Info below items (metadata) would be useful	14				35.7	28.6	21.4	14.3	5.14 ± 1.10
Info below items (metadata) helps understand content	14				14.3	35.7	35.7	14.3	5.50 ± 0.94

Table 8. Web Site Satisfaction Survey Results: Section 3, Questions 11-20

		Percentage							
		Strongly disagree					Strongly agree		
	n	1	2	3	4	5	6	7	Mean $\pm$ SD
Info below items (metadata) easy to understand	13				15.4	38.5	23.1	23.1	5.54 $\pm$ 1.05
Advanced search function easy to use	16					25.0	37.5	37.5	6.13 $\pm$ 0.81
Advanced search function easy to understand	17			5.9	5.9	23.5	29.4	35.3	5.82 $\pm$ 1.19
Advanced search function works easily	16					37.5	18.8	43.8	6.06 $\pm$ 0.93
Advanced search function would be helpful	17		5.9		5.9	17.6	29.4	41.2	5.88 $\pm$ 1.36
My Favorites function easy to use	18	16.7	22.2	5.6	11.1	5.6	11.1	27.8	4.11 $\pm$ 2.40
My Favorites function easy to understand	18	16.7	22.2	5.6	11.1	11.1	16.7	16.7	3.94 $\pm$ 2.24
My Favorites function works easily	18	16.7	11.1	16.7	5.6	22.2	11.1	16.7	4.06 $\pm$ 2.13
My Favorites function would be helpful	17	11.8	11.8	5.9	5.9	35.3	5.9	23.5	4.53 $\pm$ 2.07
Would use My Favorites function regularly	18	22.2	11.1	11.1	16.7	11.1	5.6	22.2	3.89 $\pm$ 2.27

Table 9. Web Site Satisfaction Survey Results: Section 3, Questions 21-30

| | | Percentage | | | | | | | |
| | | Strongly disagree | | | | | Strongly agree | | |
	n	1	2	3	4	5	6	7	Mean $\pm$ SD
Photos in Digital Collection make it attractive	18				11.1	38.9	38.9	11.1	5.50 $\pm$ 0.86
Photos in Digital Collection make it interesting	18				5.6	33.3	50.0	11.1	5.67 $\pm$ 0.77
Photos would encourage me to visit site again	17	11.8		11.8	17.6	17.6	35.3	5.9	4.59 $\pm$ 1.77
Visuals in Digital Collection make it attractive	18		5.6		11.1	44.4	27.8	11.1	5.22 $\pm$ 1.17
Visuals in Digital Collection make it interesting	18		5.6		11.1	38.9	33.3	11.1	5.28 $\pm$ 1.18
Visuals would encourage me to visit site again	18	11.1	5.6	16.7	22.2	11.1	33.3		4.17 $\pm$ 1.72
Information useful to my research	17			5.9	23.5	17.6	29.4	23.5	5.41 $\pm$ 1.28
I would print copies of reports in Digital Collection	18		11.1	16.7	22.2	16.7	22.2	11.1	4.56 $\pm$ 1.58
I would use Digital Collection in the future	18			22.2	27.8	11.1	22.2	16.7	4.83 $\pm$ 1.47

Table 10. Web Site Satisfaction Survey Results: Section 4

| | | Percentage | | | | | | | |
| | | Strongly disagree | | | | | Strongly agree | | |
	n	1	2	3	4	5	6	7	Mean $\pm$ SD
How frequently used Library Web site	18	5.6	16.7	16.7	22.2	11.1	22.2	5.6	4.06 ± 1.73
How useful Library Web site	17				29.4	35.3	29.4	5.9	5.12 ± 0.93
How frequently used Digital Collection in the past	18	94.4		5.6					1.11 ± 0.47
If used Digital Collection, how useful was it	4	50.0		25.0		25.0			2.50 ± 1.92

Heuristic Evaluation

The U.S. Department of Health and Human Services' (HHS) Research-Based Web Design and Usability Guidelines provide practical guidance on a broad range of Web design and communication issues. Since their introduction in 2003, the guidelines provide research-based data compiled by researchers and practitioners for identifying standards in Web design and usability and are considered highly authoritative. The most recent 2006 guidelines were used for a heuristic evaluation of the Colorado State University Libraries Digital Collection Web site.

A review of the Digital Collections Web site against these guidelines revealed that the site had some strengths and weaknesses. Characteristics that worked well included differentiation and grouping of navigation tools, including the CSU logo on every page and using a simple background to help users navigate through the site and find relevant

information. The Digital Collection is not without problems. Most importantly, the site does not maintain visual consistency between pages, lacks a clear link or button to go back to the Digital Collections site, and does not provide adequate help in searching for specific information. The home page has limited information, is brief, and does not explain the purpose of the Web site. It does not explain the concept of digital collections or the types of materials users can expect to find. The site does not provide information on the process of how the libraries create digital collections, including purpose and criteria for selecting collections for digitization. Specific problems include:

- Headers, footers, navigation, browse and search options, libraries and CSU logos, page layout, color scheme, and overall visual design are not consistent with each other, the Digital Collections site, or the CSU Libraries site.

- The font size of body text in the home page is too small. It should be 9-12 point but is only 11.4 pixels or 8.55 point. Consider adding pictures as examples of content and for visual interest and motivation.

- Pull-down menus for browsing and viewing collections make the options more difficult to see and less accessible than plain links.

- Users are likely to expect the keyword search box to use AND instead of OR. The keyword search box does not provide help, e.g. indicate that the search is by keyword, and that search results will include only items containing all search terms. Search hints or search templates could help users.

- Individual pages within the Digital Collections Web site have little or no navigation to other pages.

- Many individual pages do not have a tagline or include a very brief description. A consistent design in adding descriptions will be helpful.

- The home page body text in most individual pages is too long. Home pages look the same as non-home pages because the page layout, header and graphical banner size are the same, and the page body usually does not have prominent links to main categories or subcategories.

- Text-based pages often use long, complicated words, sentences and paragraphs with passive voice. Some of the scientific language may be too complicated for younger audiences, e.g. characteristics, habitat, diet and taxonomy could be types, places, foods and names.

These findings demonstrate potential areas for revision of the Digital Collections Web site.

Conclusion

This project demonstrates the importance of conducting heuristic evaluation and usability testing with the target audience. The Web sites on Digital Collections and Western Waters Digital Library received a positive reaction from the study participants. These participants were not previously exposed to this Web site and this was useful in identifying success and difficulties in various task completions. The tasks that have poor completion rates should be re-evaluated to enable future ease in navigation. This study did not analyze all the possible tasks embedded in these Web sites. It is critical to conduct ongoing usability testing when new features are added or revised to obtain users' perspectives on ease of navigation.

The current study was limited to the students of CSU and cannot be generalized to the usability issues of other users who may access these Web sites. Both usability testing and heuristic evaluation identified areas for potential future efforts to improve these Web sites.

Recommendations

- Prioritize and address the tasks with completion rates below 80% in Digital Collections and Western Waters Digital Library usability testing.

- Advertise the sites' historical information and collections so that more users can access these valuable resources.

- Address the eight specific problems identified in the heuristic evaluation.

- Repeat usability testing after site redesign to assess improvements to the existing Web sites.

References

U.S. Department of Health and Human Services (2006). *Research-Based Web Design & Usability Guidelines*. Washington, D.C: Author. Retrieved May 8, 2007, from http://usability.gov/pdfs/guidelines_book.pdf.

Appendix A

Usability Assessment Consent Form

COLORADO STATE UNIVERSITY INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT

TITLE OF PROJECT: Exploring alternative design principles for Web sites 2000 and beyond: An iterative investigation.

NAME OF PRINCIPAL INVESTIGATORS: Donald E. Zimmerman

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS: Don Zimmerman 491-5674

SPONSOR OF THE PROJECT: CSU's Morgan Library.

PURPOSE OF THE RESEARCH: The purpose of the research is to assess different layout and designs of World Wide Web home pages and sites.

PROCEDURES/METHODS TO BE USED: We would like you to: (1) Find specific information in selected Web sites; and (2) Complete a questionnaire about your reactions to the Web sites, your prior computer use, and selected demographic information. The control numbers on the questionnaires allow us to match participants' responses to the questions before and after using the Web sites.

We will videotape you as you use the Web site and the computer screen, and we will record your comments as you perform the tasks. The videotape is for research, and your name will not be used in the data or any report.

As part of the study, you agree to be videotaped and for the tapes and excerpts from them to be used in the research project designed to assess layout and design of WWW pages. If you sign this consent form agreeing to participate, then you are allowing us to videotape you.

Are you willing for us to use the videotapes for the additional uses listed below? If so, please initial your responses.

1. Other usability research? __ Yes __ No
2. In classes for training technical communicators?
       __ Yes __ No
3. Research presentations demonstrating study results? __ Yes __ No

The tapes will be retained for three years and then destroyed.
Your participation will take about 90 minutes.

RISKS INHERENT IN THE PROCEDURES:

There are no known risks for participating in this research.

It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

BENEFITS: You will benefit by better understanding how to use World Wide Web sites. The information gained from this research project will be used to help improve Web sites.

COMPENSATION: You will receive a $20 gift certification to the CSU Bookstore as a token of our appreciation for helping with the project.

CONFIDENTIALITY: Your name will not appear in the data or in any report on the project, and you will not be identified by name. You are assured of confidentiality to the extent legally possible.

LIABILITY: The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about participants' rights may be directed to Janell Meldrem at 970-491-1655.

PARTICIPATION: Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing one page.

If you decide to participate in the study, you may withdraw your consent and stop participating at any time.

_____
Participant name (printed)

_____
Participant signature   Date

_____
Witness to signature (project staff)   Dat

Appendix B

Protocol for CSU Digital Collections & Western Waters Digital Library

Assume you are writing reports that will require you to use the CSU Digital Collections. As you work, please talk aloud and tell us what you're doing. Answer the questions asked and write down the page title where you found the information. We're interested in learning how students, faculty and others will go about learning how to use the CSU Digital Collections. We are not testing you, but evaluating how the CSU Digital Collections will be used, and how the site might need to be changed.

1. Start at the CSU Libraries Home Page and find the Digital Collections site. How many collections are available in CSU Digital Collections? What topics are included? What kinds of materials are provided in the collections?

_____

Name of page: _____

2. If you had a job as a writer for a magazine, could you use the images from the Digital Collection? What guidance does the CSU Digital Collection Web site give you?

_____

Name of page: _____

3. What organization on the site has been involved in Colorado's flower industry? Which of the collections would you use?

_____

Name of page: _____

4. If you wanted to find images, such as photographs, drawings, and other illustrations in the collections, how would you do so? Please show us by reviewing one of the collections.

_____

Name of page: _____

5. If you wanted to find information about water and animals in the collections, how would you find that information?

_____

Name of page: _____

6. Assume you would like to change how the Digital Collection looks on your computer. Using the Digital Collection functions—not your browser, determine how you could make changes using the Digital Collections settings. Answer the following questions, but do not make the changes. What changes can you make? Please tell us how you would go about making the changes? Change the display of 100 images to a table with the image, title and subject.

_____

Name of page: _____

7. If you couldn't figure out how to use the Digital Collections, where would you find an overview giving you general guidance?

_____

Name of page: _____

8. What directions does the Help function provide?

_____

Name of page: _____

9. Assume you're having a problem and need to contact the Libraries about it. How would you send a message to the Libraries about you problem with the Digital Collections site? Find a page that allows you to contact the Libraries.

_____

Name of page: _____

10. Assume you would like to know about the gestation period of the Asian false vampire bat that's pictured in the Garst Wildlife Photographic collection. Find and report that information.

Name of page: _____

11. Assume you will be using the Digital Collections site frequently, and would like to save items that you would use frequently? Insert items from two of the collections into My Favorites.

_____

Name of page: _____

Protocol for CSU Digital Collections & Western Waters Digital Library

Western Waters Digital Library

NOTE: Start at the Western Water Digital Library Home Page:
      http://www.westernwaters.org/

Assume you are researching how archiving projects are funded and you want to know how the Western Waters Digital Library has been funded. Locate information on the funding of the Western Waters Digital Library.

1. What grant funded the Western Waters Web site? Digital Library:

    _____
    Name of page: _____

2. Assume you are a researcher in New Mexico, and you want to know if your institution has participated in developing the Western Waters Digital Library. What institution(s) from New Mexico have participated in developing the Western Waters Digital Library?

    _____
    Name of page: _____

3. Search the Western Waters Digital Library for "**Columbia River**" in the **title**. How many items have Columbia River in the title? _____

    _____
    Name of page: _____

4. Next search the Western Waters Digital Library for ANY of the words "Cloud Water" in the subject.

    _____
    Name of page: _____

5. Name two collections contained in the Colorado River Basin collection?

    _____
    Name of page: _____

6. Search the "Western Waters Digital Library" for the term "Whaling". How many items do you find? _____
_____
    Name of page: _____

7. On what page of the Western Waters Digital Library do you find information on "Technical Details"? _____
_____
    Name of page: _____

8. Conduct an "Advanced Search" from the Western Waters Digital Library using the words "Colorado Region" and using "selected fields" as search criteria. How many **items** do you find with Colorado Region in the title?

_____

Name of page: _____

9. How many collections are in the Western Waters Digital Library? Name them.

_____

Name of page: _____

10. What page of the Western Waters Digital Library contains links to other water Web sites about water resources?

_____

Name of page: _____

11. Conduct a search for **images** using the word "**fishing**." What is the 15th image returned by the search?

_____

Name of page: _____

Thanks for helping with this research project.

Appendix C

Web Usability Questionnaire   Control No. _____   **1**

Part I: Assessment of the Web Site
Based on your Web site session today, please answer the following questions in the spaces provided.

1. What do you like about this Web site?

_____

_____

_____

2. What you dislike about the Web site?

_____

_____

_____

3. Which sections were the most difficult to use? Why?

_____

_____

_____

4. Were you able to complete the assigned tasks?
          ____ Yes   ____ No

   4a. If no, why do you feel you were unable to complete the tasks?

   _____

   _____

5. Were there any aspects of the Web site that you found particularly irritating, although they did not cause major problems?

_____

_____

_____

6. What changes would make the Web site easier to use?

   _____

   _____

Part II. For each of the following items below, please tell us how much you agree or disagree with each statement. Use a 1 to 7 scale where 1 = Strongly disagree and 7 = strongly agree. **If the question does not apply to this Web site or you, circle NA.** Please circle your responses.

	Strong Disagree						**Strongly agree**	
1. I was satisfied with my experience using the Web site.	1	2	3	4	5	6	7	NA
2. I found the links between pages hard to understand.	1	2	3	4	5	6	7	NA
3. I could easily correct any errors (problems) I made/encountered while using the Web site.	1	2	3	4	5	6	7	NA
4. The diagrams and graphics enhanced the Web site.	1	2	3	4	5	6	7	NA
5. The text has too much information-- it makes it hard to understand the topic.	1	2	3	4	5	6	7	NA
6. The site's left-hand navigation was helpful.	1	2	3	4	5	6	7	NA
7. The words on the screen were legible (easy to see).	1	2	3	4	5	6	7	NA
8. I found the site confusing to use.	1	2	3	4	5	6	7	NA
9. I found the information easy to understand.	1	2	3	4	5	6	7	NA
10. The site layout was easy to follow.	1	2	3	4	5	6	7	NA
11. I never felt lost when using the site.	1	2	3	4	5	6	7	NA
12. I felt overwhelmed when using the site.	1	2	3	4	5	6	7	NA
13. I made few errors when using the Web site.	1	2	3	4	5	6	7	NA
14. The pages loaded quickly.	1	2	3	4	5	6	7	NA
15. I found the site very easy to use.	1	2	3	4	5	6	7	NA
16. I found the narrative easy to understand.	1	2	3	4	5	6	7	NA
17. I was not at all frustrated when using the site.	1	2	3	4	5	6	7	NA
18. I found the site to be well-written.	1	2	3	4	5	6	7	NA
19. The site was not interesting to use.	1	2	3	4	5	6	7	NA
20. The site has too much information in .pdf files.	1	2	3	4	5	6	7	NA
21. I prefer to print and then read Web pages.	1	2	3	4	5	6	7	NA
22. I found the design of the links inconsistent.	1	2	3	4	5	6	7	NA
24. The font (typeface) was hard to read.	1	2	3	4	5	6	7	NA
25. The font (typeface) was too small to read.	1	2	3	4	5	6	7	NA
26. I could easily find the information on the Web site	1	2	3	4	5	6	7	NA
27. The site design is attractive.	1	2	3	4	5	6	7	NA
28. The colors are pleasing.	1	2	3	4	5	6	7	NA
29. I prefer reading information online rather than downloading .pdf files and then reading the printed file.	1	2	3	4	5	6	7	NA
30. Printing pages was easy.	1	2	3	4	5	6	7	NA
31. I found the text (labels) of the links helpful.	1	2	3	4	5	6	7	NA
32. I prefer links in a left-hand column.	1	2	3	4	5	6	7	NA
33. I prefer links across the top of the page.	1	2	3	4	5	6	7	NA
34. I prefer links both on the left-hand column and across the top of the page.	1	2	3	4	5	6	7	NA

Section III. The section of the Web site that you have used is called the Digital Collection. Its purpose is to provide access to a variety of information, communication, and products produced by CSU faculty and residents in the West. Over the coming decade, the Library staff will be adding more information to the Digital Collection. The questions below focus specifically on the Digital Collection features and information provide. For each of the following items below, please tell us how much you agree or disagree with each statement. Use a 1 to 7 scale where 1 = Strongly disagree and 7 = strongly agree. If the question is not applicable, circle NA.   Please circle your responses.

	Strong Disagree						**Strongly agree**	
1. The Help feature was easy to use	1	2	3	4	5	6	7	NA
2. The Help feature was easy to understand.	1	2	3	4	5	6	7	NA
3. The Help feature was useful.	1	2	3	4	5	6	7	NA
4. The Browse feature was easy to use.	1	2	3	4	5	6	7	NA
5. The Browse feature was easy to understand.	1	2	3	4	5	6	7	NA
6. The zoom and pan feature was easy to use.	1	2	3	4	5	6	7	NA
7. The zoom and pan feature was helpful.	1	2	3	4	5	6	7	NA
8. The information below the items (metadata) was easy to find.	1	2	3	4	5	6	7	NA
9. The information below the items (metadata) would be useful.	1	2	3	4	5	6	7	NA
10. The information below the items (metadata) helps me understand the content.	1	2	3	4	5	6	7	NA
11. The information below the items (metadata)was easy to understand.	1	2	3	4	5	6	7	NA
12. The Advanced Search function was easy to use.	1	2	3	4	5	6	7	NA
13. The Advanced Search function was easy to understand.	1	2	3	4	5	6	7	NA
14. The Advanced Search function works easily.	1	2	3	4	5	6	7	NA
15. The Advanced Search function would be helpful.	1	2	3	4	5	6	7	NA
16. The My Favorites function was easy to use.	1	2	3	4	5	6	7	NA
17 The My Favorites function was easy to understand.	1	2	3	4	5	6	7	NA
18. The My Favorites function works easily.	1	2	3	4	5	6	7	NA
19. The My Favorites function would be helpful.	1	2	3	4	5	6	7	NA
20. I would use the My Favorites section regularly.	1	2	3	4	5	6	7	NA

Section III. Cont'd. The questions below focus specifically on the Digital Collection features and information provide. For each of the following items below, please tell us how much you agree or disagree with each statement. Use a 1 to 7 scale where 1 = Strongly disagree and 7 = strongly agree. If the question is not applicable, circle NA. Please circle your responses.

	Strong Disagree						**Strongly agree**
21. The photographs on the Digital Collection make it attractive.	1	2	3	4	5	6	7 NA
22. The photographs on the Digital Collection make it interesting.	1	2	3	4	5	6	7 NA
23. The photographs would encourage me to visit the site again.	1	2	3	4	5	6	7 NA
24. The visuals in the Digital Collection makes it attractive.	1	2	3	4	5	6	7 NA
25. The visuals in the Digital Collection makes it interesting.	1	2	3	4	5	6	7 NA
26. The visuals in the Digital Collection makes it interesting.	1	2	3	4	5	6	7 NA
27. The visuals would encourage me to visit the site again.	1	2	3	4	5	6	7 NA
28. The information would be useful for my research?	1	2	3	4	5	6	7 NA
29. I would print copies of the reports in the Digital Collection.	1	2	3	4	5	6	7 NA
30. I would use the Digital Collection in the future.	1	2	3	4	5	6	7 NA

31. What kinds of information would you like to see added to the Digital Collection?
_____

_____

Part IV. General Library Use.

1. How frequently have you used the Library Web site in the past? Please circle your response.
         Not at all   1   2   3   4   5   6   7   Very frequently

        1B. If you have used the Library Web site, how useful was it?
        Not at all useful 1   2   3   4   5   6   7   Very useful

2. How frequently have you used Digital Collection in the past? Please circle your response.
         Not at all   1   2   3   4   5   6   7   Very frequently

        2A. If you have used the Digital Collection, how useful was it? Please circle your response.
        Not at all useful 1   2   3   4   5   6   7   Very useful

        2b. Did you encounter any difficulties in the past when using the Digital Collection?

        __ No   __ Yes 2c. If yes, please describe.
_____

V. Computer Experience

1. In column A, please enter the number of years of experience you have had with each hardware or software product. In Column B, please indicate your expertise using a 1 to 7 scale where 1 = none and 7 = a great deal. Please circle your responses.

	Column A	**Column B**	
	Years	**None**	**A Great Deal**
a. Using a personal computer	___	1 2 3 4 5 6 7	
b. Using the World Wide Web	___	1 2 3 4 5 6 7	
c. Personally downloading Adobe's Acrobat Reader software	___	1 2 3 4 5 6 7	
d. Downloading .pdf files	*___*	*1 2 3 4 5 6 7*	
e. Installing software	___	1 2 3 4 5 6 7	
f. Installing hardware	___	1 2 3 4 5 6 7	
g. Filling out applications/forms online	___	1 2 3 4 5 6 7	
h. Installing Flash updates	___	1 2 3 4 5 6 7	

2. Do you have a computer or laptop at home?

__ No __ Yes

2a. Which do you have? __ Laptop __Desktop __ Both

2b Are you connected to the World Wide Web (Internet) via telephone modem or broadband connections?

__ Telephone modem
__ Broadband connection

2c. If broadband, is it by
__ DSL
__ Cable
__ Wireless
__ Satellite
__ Other

2d What browser do you use to search the World Wide Web (Internet)?
__ Microsoft Internet Explorer
__ Netscape
__ Firefox
__ AOL
__ MSN
__ Yahoo
__ Other If other, please specify:_____

Part VI. Background Information

1. How old are you? _____

2. What is your gender? ___ Female ____ Male

3. What is your current year in school? __ Freshman __ Sophomore __Junior __Senior __Grad Student ___ ___Special

4. What is your major? _____

Thanks for your help.
E:\JTT661\DEZ_DB_Post_usability_AA_30March2k7.doc