

ARTstor Usability Evaluation

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Abstract: During Fall 2003, task-based usability testing was conducted of a new digital library featuring over 150,000 images of art, archaeology, architecture, and cultural objects. The purpose of the testing was to determine the ease of use of the library and how it might be changed to improve the novice user experience. The 30 test participants use digital images in research, teaching, or learning in the college, university, or museum sectors. Tasks performed by participants included searching for and viewing images and related data, consulting help, registering, saving images, and completing a post-session survey. Findings from the tasks and surveys completed by participants are presented in this paper, along with possible solutions to remedy difficulties the participants encountered.

Introduction

ARTstor is a digital library of art images that supports educational and scholarly uses. The ARTstor collections feature images commonly used in art history survey courses, as well as more specialized collections. Users can find images in the ARTstor collections via a basic or advanced search, or by browsing the categories in each collection. Images can be saved as a group for later use, such as studying for an exam or illustrating a lecture. Individual images can be viewed in many ways: panning, zooming, full-screen display, and side-by-side comparison.

ARTstor continues to be refined while available at several colleges and universities in a beta test capacity. The usability evaluation (Nielsen 1993) was conducted at a subset of these sites in order to assess novice ARTstor user experience, and to identify changes that might enhance the user experience. The purpose of the task-based usability testing was to observe users interacting with ARTstor. The tasks were designed to elicit use of a range of different features. Two texts on usability testing provided guidance on the test process (Rubin 1994 and Dumas & Redish 1993). Several studies have employed task-based testing in the usability evaluation of a library web site; the one most relevant to this work is (McGillis & Toms 2001).

Methods

Task-based usability tests were conducted at Johns Hopkins University, James Madison University, Princeton University, and Williams College. Each test session consisted of one participant using ARTstor to complete a series of tasks. A facilitator gave the participant a brief introduction that included the process of gaining the participant's informed consent, issued each task to the participant, and took notes on the participant's actions. In most sessions, an observer took notes on what the participant said and recorded the participant's

comments on tape. While the observer was often able to write down all of the comments, the tape was useful when a participant had much to say.

The tasks prompted participants to search and browse for various art images, to register and log in, to save selected search results and come back to them, to use the help documentation, and to try out various image display options. (See Appendix.) After the participant completed the tasks, the facilitator gave the participant a satisfaction survey with some demographic questions.

At each location, six or more participants were recruited to test the ARTstor interface, for a total of thirty participants. A mix of faculty, graduate students, undergraduate students, and library and museum staff was sought to participate. The majority of participants study or work in the discipline of art history.

Of the thirty participants, eleven were Art History faculty members. Each specified a particular area of specialty, to include the Ancient to Modern periods in Western and non-Western art. All six graduate students were Art History majors. Six of the undergraduates were Art History majors. The other two undergraduates were Art Studio and Liberal Arts majors respectively. Five art museum staff members from The Baltimore Museum of Art, the Clark Art Institute, the Historic Houses of The Johns Hopkins University, and The Walters Art Museum participated in the testing. Some of them noted an area of specialty, including collections, American Decorative Arts and Culture, and Nineteenth Century research.

Five participants had used ARTstor prior to the usability testing. Twenty-four of the participants had used other programs to view digital art images. They listed a variety of different programs and web sites from a range of national and regional museums and libraries, academic institutions, and commercial enterprises.

Most of the participants use a PC, but four participants use a Mac, two participants use a PC and a Mac, and one participant uses a PC, a Mac, and a Linux computer. Most of the participants use the Internet Explorer browser; of the twenty-eight who do, ten also use Netscape, two also use Mozilla, and one also uses Safari. One participant uses Safari. One participant uses AOL. All test sessions employed Internet Explorer on a PC.

Findings

Navigation

Navigating from the ARTstor homepage to the main library page where a search could be initiated proved to be a challenge for some participants. Of the 30 participants, 22 clicked on the "Enter the Library" link on the homepage without giving up and receiving assistance from the facilitator. Four of these participants clicked on "Enter the Library" before selecting any other links; two of these four had used ARTstor before. The 18 other participants who did not give up clicked on an average of 5.2 links before selecting "Enter the Library." The eight who needed assistance clicked on an average of 8.9 links before giving up. The other links that participants selected included "Collections," the pages that give brief descriptions of the collections, and pages in the Using ARTstor section. They spent a lot of time looking for a search function.

After participants found the main library page and performed a search, half of them wanted to return to the main library page to conduct their next search, despite the presence of a search box on the Thumbnail (search results) page. Seven participants discovered that the ARTstor logo would take them back to the main library page. A few participants selected "Clear," but that did not return them to the main library page; the "Clear" function deselects thumbnails. Some participants clicked on the previous page of results button, but that did not take them to the main library page. Participants selected it even when they were on the first page of results and the button was grayed out.

Grayed-out links were problematic in other places, as well. Ten participants clicked on the grayed out "Save" when they wanted to create a group, not realizing that "Save" is for making changes to an existing group. Several participants commented that the many grayed out options were confusing.

The "Go To" option offers a means of returning to the results of a previous search. A few participants discovered "Go To" on the menu that appeared when they right-clicked. Five participants found "Go To" on the "Shortcuts" menu. However, most participants typed the search terms again to return to previous results.

One of the collections available in ARTstor is called "The Image Gallery." This title was a problem for some users: when users could not get back to the main library page from the Thumbnail page, a number of them clicked on "Collections." Not knowing which to select, they decided upon "The Image Gallery," thinking that this comprised all ARTstor collections. Between this situation and the occasions when participants selected

"The Image Gallery" instead of "Enter the Library," a total of 12 participants experienced some confusion over the identity of "The Image Gallery" as a particular collection.

Searching and Browsing for Images

All 30 participants were able to find an image of a teapot, and 27 of them limited the search to or browsed in the Museum of Modern Art Architecture and Design Collection, as the first task requested. While on the main library page, two participants hit Enter/Return on their keyboard, thinking that it would initiate the search. Both then realized that they needed to click on the search button instead.

For the task where participants were asked to find either a mosaic in the Image Gallery or a painting by Dürer in the Art History Survey Collection, 28 participants successfully limited the search to or browsed in the requested collection.

When participants were given two artist/title pairs, 21 found the requested artworks either using the advanced search or using multiple terms in the keyword search. Seven found the requested artworks by selecting a collection and searching with one term only; two had difficulty finding the artworks. Twenty-four participants were asked to find the dates of these artworks; twenty-three of them were successful.

Overall, participants had good experiences using the keyword search function. Some were pleased to be able to enter two terms, such as {manet olympia}, and have the terms treated as though there were an AND between them. Some participants wanted to search within a different collection using the search box on the Thumbnail page, but the only options there are to search all collections or the collection or category that has just been searched. In order to search within a different collection, users must either select that collection from the collections dropdown menu or return to the main library page via the ARTstor logo and select the collection from the keyword search dropdown menu.

Some participants had difficulty with the advanced search. Some thought that they had to choose from the dropdown menu options, even when what they were looking for was not on the list. They did not realize that they could type in those boxes. A number of participants commented that they might not want to click on the "Filtered Search" button to initiate the search, but most clicked on it because it was the only "Search" button there.

When given the option to search or browse, participants tended to search rather than browse, but that may be due to the nature of the tasks. When participants did browse, they generally had a good experience, especially after realizing that it is possible to search within a browse category.

Interacting with Groups of Images

The results of searching or browsing appear on the *Thumbnail page*, where as many as 15 small images appear, each with the first 20 characters of the title and the artist listed below. Some participants requested that more data about the images appear on the thumbnail page, such as the date and origin. This tended to arise for anonymous items such as "Jar," where the title does not provide much information about the work. Twenty-eight participants were able to find more data either by double-clicking on the title under the thumbnail or by clicking on the 'Image data window' button while looking at a single image in the Image Viewer. Two participants did not find this data.

Participants were asked to find some images of bridges and to save them for later. Except for the three participants who were not asked to do this task because of system problems or time limitations, all 27 participants found images of bridges and selected some thumbnails. Twenty-two of these participants saved some bridge thumbnails into groups. Success rates were similar for the next task, which was to create an image group of Native American pottery from the Carnegie collection. However, one participant refused to attempt this task, following the frustrating experience of the bridge task, and one participant saved pottery images that were not from the Carnegie collection. Twenty-four saved pottery images to a group.

Some participants had difficulty *saving images to groups*. The biggest challenge was to both 1) select the folder "My Work Folder" and 2) come up with a group name. Fourteen participants tried to type a new folder name or tried to type a group name without selecting a folder; most eventually figured out that they had to select "My Work Folder," but three required assistance from the facilitator. To some participants, it was not evident that it was possible to type in a group name, because it was not possible to type a folder name. Six participants received error messages regarding their group names; most had failed to specify a name, but a few

had given a group name that was too long. Of these six, five were successful in specifying a group name without the facilitator's help.

Of the 20 participants who selected "My Work Folder" without assistance, nine selected it on their first attempt. The other 11 took an average of 1.7 attempts before selecting "My Work Folder." The three participants who gave up made an average of 2.0 attempts before giving up. Of the 21 participants who typed in a group name without assistance, 16 typed one in on their first attempt. The other five took an average of 1.4 attempts before typing a group name.

Some participants had problems saving images into groups that were not related to selecting "My Work Folder" and specifying a group name. A few participants did not find the 'save images into group' function. Five participants thought initially that the task was asking them to download or print the images, but three of them were eventually successful in saving.

Twenty-three participants successfully added an image to an existing group. Of the seven who did not, four were not asked to do so, two got stuck trying to find images to add, and one had trouble dragging and dropping thumbnails into the group. Only five participants opened the group in a separate window.

Some participants were confused when they had saved search results into a group and *opened the group* without opening a new window. They wondered how they could get back to their search results, and they were frustrated in having to redo their search. Participants were sometimes confused about how to find the group that they saved, because there were more folders to choose from when opening a group than when saving to a group.

One task asked participants to look at a group they had created and to rearrange the order of the thumbnails. This required them to drag one thumbnail on top of another. Of the 25 participants who encountered this task, 23 initially tried moving the last thumbnail to the left of the first thumbnail, which the system does not allow. Twenty were ultimately successful in dragging and dropping. Thirteen read the instructions at the top of the screen, and six attempted to consult the help section.

When participants do several different searches and then decide to create an image group out of some of the images in their most recent search, they are often surprised when an image from a past search appears in the group. Sixteen participants had one or more images from a prior search in a group that they opened. All eight participants who attempted to delete such images from their groups were successful.

Interacting with Individual Images

ARTstor provides several means of interacting with individual images. When users double-click on a thumbnail, it opens in an Image Viewer (Fig. 1). Users may pan, zoom, download, and maximize the image using the Image Viewer.

Most participants were able to *zoom* and *pan* successfully, using one or more of the zooming and panning options. All 30 participants opened the Image Viewer for the panning/zooming task. Twenty-seven zoomed, and 26 panned. The few participants who did not zoom or pan either encountered a viewer that did not load properly or simply did not attempt to zoom or pan once opening the viewer. One problem a few participants encountered was that they would try to click on an arrow to pan, but they would click next to it and zoom in instead.

Several participants noted that they could not see the bottom of the Image Viewer, because it was too large and could not be moved up far enough to see the bottom. The Windows taskbar partially obscured the tools at the bottom of the window. Several participants tried to use the grayed out maximize button in the top right corner of the window before finding the maximize button near the bottom of the window.

When participants tried to view images side-by-side, they did not expect the first image displayed in an Image Viewer to be hidden behind the Thumbnail page when they opened a second Image Viewer. Some participants found that they could bring the first image up again by clicking its button in the taskbar. However, the taskbar would sometimes disappear when the second Image Viewer was opened, further obscuring the first Image Viewer. Six participants re-did their searches because they did not know that they could click on the taskbar to bring back the first Image Viewer. Nineteen participants successfully displayed the two images side-by-side in two viewers; seven only displayed the two thumbnails side-by-side in a group.

Nineteen of the 23 participants who were asked to *download* an image found the download disk icon in the Image Viewer. Seven participants opened the terms and conditions. Three participants commented or asked about the safety of accepting the security warning. Six participants received an error message. Of the twelve participants who reached the point of saving the image locally, seven of them attempted to open the image

locally; four of them were successful. Fourteen participants right-clicked on an image at some point during the session (not necessarily during the download task), expecting the right-click to allow them to download or save the image.

All 23 participants who were asked to display an image across the whole screen opened the Image Viewer; twenty of them found and used the *Maximize* icon in the Image Viewer. Seven tried to use the grayed out Maximize button in the top right corner of the Image Viewer.

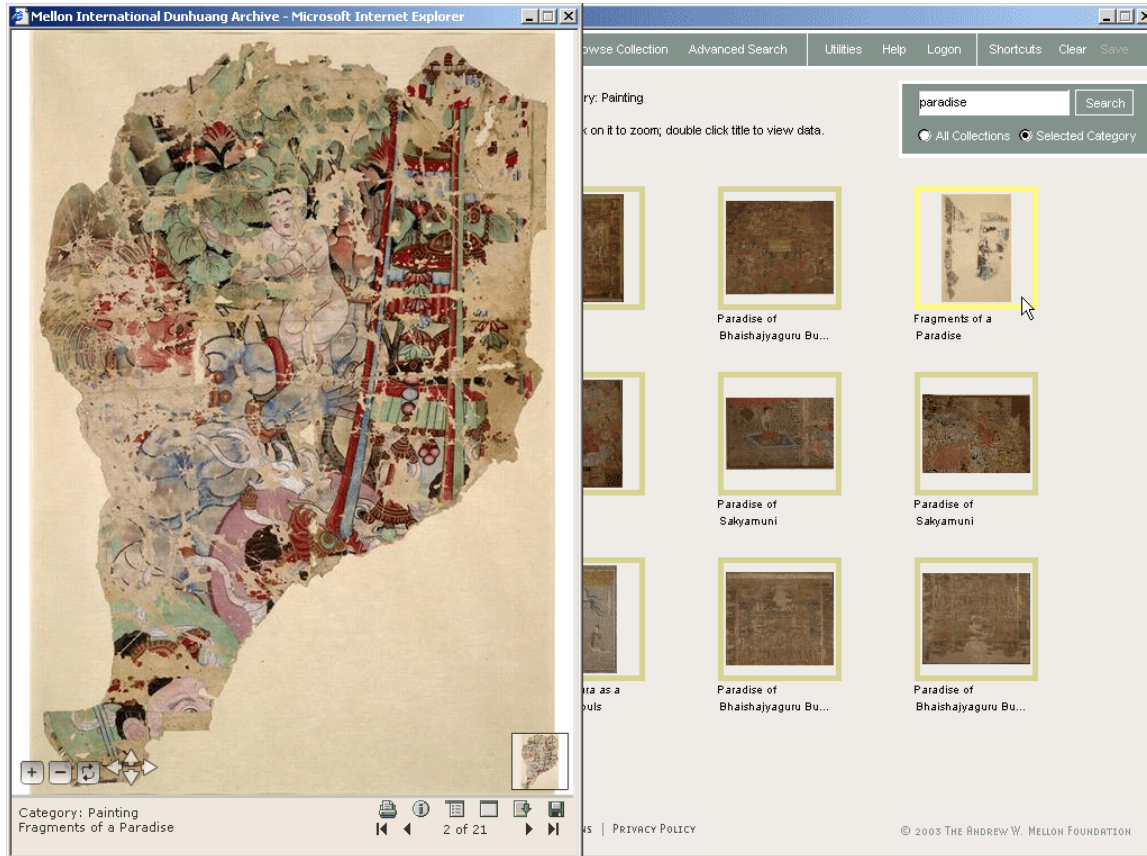


Figure 1: Opened Image Viewer (to left) overlaying Thumbnail page of results

Registration and Logon

Users can search ARTstor and view images without registering. They must register and log on to save images into groups or to view their groups. Three participants had already registered before attending the test session; all three logged on successfully. A few participants thought they had to log on before they could use ARTstor at all.

Registration is a two-stage process. The first stage, "pre-registration," involves submitting an institutional email address and creating a password. The second phase involves confirming the registration by clicking on a URL sent to that email address and selecting the 'confirm registration' link in the browser window that opens as a result. Some participants tried to register with non-institutional email addresses. Some participants do not use their institutional email addresses. Nine participants thought that they were registered after merely pre-registering; they received an error message when they tried to log on. Seven of these were ultimately successful in registering and logging on. Some participants opened their email accounts after pre-registering and found that the email from ARTstor had not yet arrived. All participants who found the ARTstor email clicked on the URL in it. In the new window that opened as a result, most selected the 'confirm registration' link fairly quickly. A few did not notice it at first or had to move windows around to find it.

Some participants did not realize that if they closed their browser they would have to log on again. Of the six participants who closed their browser, four realized that they needed to log on again, and two needed to

be prompted to log on again. A few participants noticed the "Welcome: Guest User" at the bottom of the screen and understood this as an indicator that they were not logged on.

Help

The help section can be assessed based on how participants used it during the task that dealt with the help section specifically and how they used it while working on other tasks. For the task that asked participants to print a help screen, they used a variety of navigation methods within help to find the right screen. Seventeen tried the 'How Do I' section; twelve found it there. Fifteen tried searching the help section; eight found it that way. Eleven tried the help index; five found it there. Eight tried 'Overview' and three tried 'Troubleshooting,' but none found it in either of those places. Nineteen participants successfully printed a help screen.

Participants attempted to consult the help section 32 times while working on other tasks. In 20 of these instances, they were successful in completing the task after consulting the help section. In three cases, the help section did not open properly.

Including all occasions when participants consulted the help section, 19 participants searched the help section. Four of them did not understand how the search results related to their search terms. One participant thought that the images in the help section were working links in ARTstor.

Satisfaction Survey

Participants were asked to rate ARTstor on a 5-point scale, with 5 as the best rating (Tab. 1). Ease of searching, the quality of images, the breadth of the collections, and the ability to create groups were frequently listed as the most satisfying features. The aspects that participants listed as the least satisfying features include the slowness of the system, the need to double-click, the help section, and dealing with folders when creating image groups. Most comments about what made ARTstor difficult to use called the instructions, labels, or icons unintuitive or confusing. Several participants listed the help section and the search engine as what made ARTstor easy to use. Participants named a variety of things that they would change about ARTstor, including making a more obvious library entry, adding standard browser navigation, making it easier to drag and drop thumbnails, making it easier to work with groups, adding more collections, and providing better instructions.

<i>Participant categories (number of participants)</i>	Faculty (11)	Graduate Students (6)	Undergraduates (8)	Staff (5)	Total (30)
Average experience rating	3.50	4.17	4.00	4.60	3.95
Average ease of use rating	3.55	3.67	3.88	4.00	3.73

Table 1: Satisfaction survey results

Conclusions

Navigation

Users need to be able to navigate easily from the ARTstor homepage to the main library page. Several possibilities exist that may make it easier to find the main library page from the homepage. The "Enter the Library" link could be larger and more prominent; its wording could be changed to read "Search and Browse the Collections"; search boxes could be added to the homepage and/or to the pages that describe the collections; "Search" and "Browse" links could be added to the homepage.

An explicit link could be added to the navigation bar to help users return to the main library page after a search. This link could be called "Search and Browse Collections" to be consistent with the ARTstor homepage. A "Back" button could be added to the navigation bar to facilitate return to previous results.

The confusion over the identity of "The Image Gallery" could be ameliorated by a new name for this collection, such as "Art History Survey Text Images" or by the attachment of a description, such as "Images from ten major survey texts." Another approach would be to group the list of collections into "General Art Collections" and "Special Collections."

Searching and Browsing for Images

The option to search within a different collection could be added to the search box on the Thumbnail page to make it more useful. The advanced search could be easier to use if it did not employ the combination text-boxes with dropdown menus, or if the dropdown menus only contained the prior search terms of the current user. The "Filtered Search" button on the advanced search could be renamed "Search" or "Perform Search."

Interacting with Groups of Images

The Thumbnail page could allow more space to list the title, artist, and date.

As with the advanced search, saving images to a group could be easier if the combination text-boxes with dropdown menus were avoided. With "My Work Folder" as the only folder option, confusion about folder selection could be eliminated by not asking users to select a folder; users could simply be informed that their group will be saved in "My Work Folder."

There are several changes that may make it easier for users to view and manipulate groups. The same "Back" link that could help users in other situations may help them find their search results when they have opened a group without opening a new window. Alternately, setting the default for groups to open in a separate window may help users get back to their search results. More specific instructions on dragging and dropping or more free manipulation of thumbnails may help users rearrange the order of their groups.

Saving only the selected thumbnails from the most recent search would prevent users from finding unexpected thumbnails from previous searches in their groups. However, this solution would not work for users who want to select thumbnails from several searches and save them all at once. In the context of this test, participants tended to save frequently, but this behavior should be investigated further in more open-ended test situations.

Interacting with Individual Images

A few modifications to the Image Viewer may make it easier for users to interact with individual images: larger arrows for panning, a smaller or resizable Image Viewer so that the controls are always visible, and an active Maximize button in the top right corner of the window. Using the title or artist name as the Image Viewer name may help users who are juggling between multiple Image Viewers, as this name is displayed in the taskbar.

Registration and Logon

Users may gain a better understanding of why and how they should register and log on if the benefits of registration are more prominently displayed and if a checklist shows a user's progress in the multi-step process of registering and logging on. The greeting that welcomes a guest user or the name of a user who has logged in could be more prominent. The ARTstor homepage could link directly to the logon function.

Help

A few changes to the help section may make it easier to use. The help index could include more terms. Help search results could include both the page titles and snippets from the page content that match the search terms. Images in the help section could be labeled "Sample" to provide a cue that they are not functional links.

Appendix

1a: Using ARTstor, find an image of a teapot in the MOMA Architectural & Design Collection.

1b: Find out who designed this teapot.

2a: Using ARTstor, browse the Art History Survey Collection to find an image of a painting by Albrecht Dürer. [Or, if participant uses browse feature for task 1, change "browse" to "search"] (For Participants 1-6, task 2a read: Using ARTstor, browse the Image Gallery collection to find an image of a mosaic. [Or, change "browse" to "search" if needed.]

2b: Look at the painting by Dürer up close. Look at his signature; then, look across the image for any additional artist's markings he may have made. (For Participants 1-6, task 2b read: Look at this mosaic up close. Look at the focal area of the mosaic; then, look at the peripheral areas of the mosaic.)

3: If you are already a registered user of ARTstor, please log in. If you are not yet registered, please register and then log in.

4: You are conducting research for your thesis on bridges in different artistic and documentation styles and need a variety of images to include in your paper. Conduct a search. Select three or more images in different styles and save them for later.

5: You are an anthropology professor teaching a course on Native American culture. You use slides in teaching and would like to refer some of your students to ARTstor for independent study after class, so you are seeking images of pottery. You choose to search in the Carnegie collection. Create an image group of Native American pottery.

6a: Your Art History 101 survey professor has suggested you prepare a paper comparing and contrasting the dates, styles, and historical contexts of Manet's "Olympia" and Ingres's "La Grande Odalisque"; find out the dates of these two paintings. (For Participants 1-6, task 6 read: Your Art History 101 survey professor has suggested you prepare a paper comparing and contrasting the dates, styles, and historical contexts of "Descent from the Cross" by Rembrandt and Rubens; find these paintings and do a side-by-side comparison.)

6b: Do a side-by-side comparison of Manet's "Olympia" and Ingres's "La Grande Odalisque."

7: Look at the images of bridges that you saved. Move the last image in the group to the first place. Move what is now the second image in the group to the last place.

8: You want to be able to truncate a search term to broaden your search. Print the help screen that explains how to truncate.

9: You decide that you need another example of Native American pottery. Find another image and add it to the images you already saved. (Task 9 was not presented to Participants 1-6.)

10: Find an image of your choice and download it. (Task 10 was not presented to Participants 1-6.)

11: Find an image of your choice and display it across the whole screen. (Task 11 was not presented to Participants 1-6.)

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