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Image Seeking Behaviors in a Local History Collection

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Image Seeking Behaviors in a Local History Collection

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Introduction

Digital image collections are a relatively recent development and very little is known about information seeking behavior and interaction with images in the digital environment. Digital library collections were first introduced in the 1990s with improvements in digital imaging, the development of networks, and capabilities in online presentation (Lesk, 2005; Zick, 2009).

Digital libraries and the collections created through digitization projects offer many potential advantages for higher education and within the greater academic environment (Blandford, 2006; Borgman et al., 2005; McMartin et al., 2008). The digital format broadens the availability of rare and unique resources. Collections of digitized objects provide scholars, educators, and students with the opportunity to study these primary sources which were previously difficult or impossible to access. Many resources which are too fragile for physical handling may be both viewed and interacted with in the digital environment. The offering of these sources in digital libraries allows for preservation, access, utilization, and academic inquiry.

While the number of digital image collections continues to grow, there is relatively little research related to the discovery of and information seeking behavior within these collections. This paper reports the results of a case study on discovery and information seeking behaviors of students utilizing archival images housed at the University of Denver's Main Library. The collection, Digital DU, contains "digital assets that are of historical or significant value to the University of Denver" (Digital DU, 2013) and includes a large number of digitized documents, audio recordings, videos, photographs, maps, and art. This study focused on the use of images within the collection.

Related Work

Information behavior describes the "activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information" (Wilson, 1999). Many models of these behaviors have been developed to describe how people interact with information, but two are particularly applicable to this study.

Wilson's Model (Figure 1) provides a general perspective on information behavior, taking into account many factors which play into the behaviors of an individual (Wilson, 1997). This broad view of information behavior emphasizes the importance of the "person in context" (Wilson, 2000) or a "person performing a role in an environment" (Wilson, 1997).
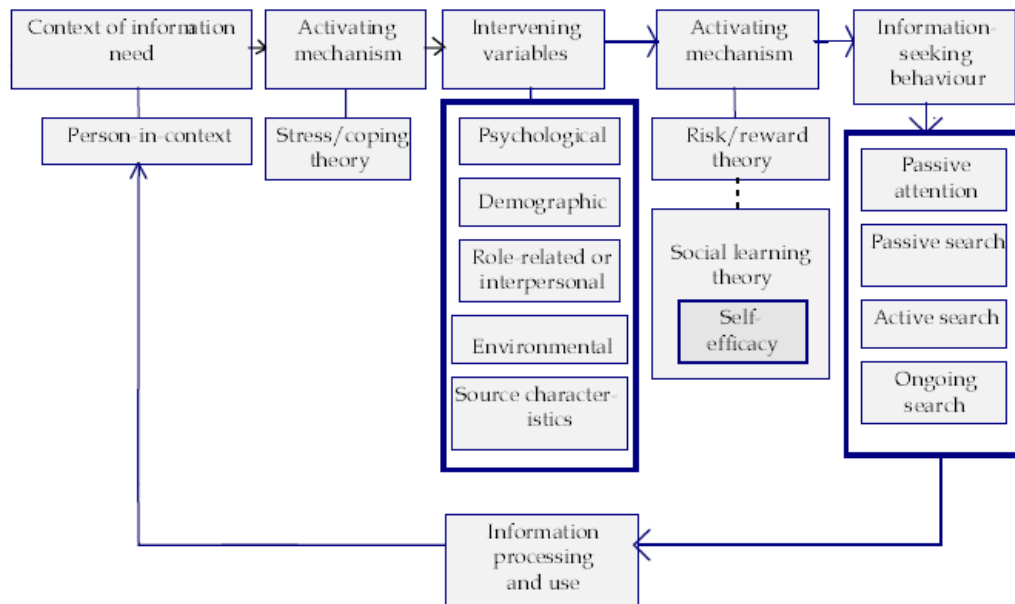
© T.D. Wilson 1996   Figure 1. Wilson's 1996 model of information behavior

Figure 1: Wilson's Model (1997)

The model draws upon concepts and theories from a variety of fields, such as psychology, sociology, and marketing, among others. This interdisciplinary approach addresses internal and external factors which may affect an individual's information

behavior, such as coping methods, access, knowledge base, personal preferences, information avoidance, or potential risk and gain (Wilson, 1997). Information seeking behavior is presented as a part of overall information behavior which may be described in further detail using more narrowly focused models.

Conniss, Ashford, and Graham created a model (Figure 2) of information seeking behaviors specifically related to image seeking (2000). This model was based on a study of professional image users from a variety of fields, such as academic art history, broadcasting, architecture, a museum, a police force, radiology, and publishing. The results of the study were generalized in a six stage overview of image seeking behaviors: starting, scoping, applying, selecting, iterating, and ending. These stages are meant to be viewed as phases or strategies within the seeking process and provide a general description of behaviors which may occur in response to specific circumstances. The stages are not sequential, but may be passed through as the user encounters different points in a search. The key feature of this model is iteration as the user starts (by identifying or refining a need for information and determining the criteria of a suitable image), scopes (by determining how broad a search to do and later refining for broader or narrower results), applies (by performing or modifying a search), and selects (by viewing or choosing images, determining if those images match the criteria, and either using or discarding the image). Each of the phases interacts with the others as they are repeated until the user either selects a final image or abandons the search in the ending phase (Conniss, 2000).
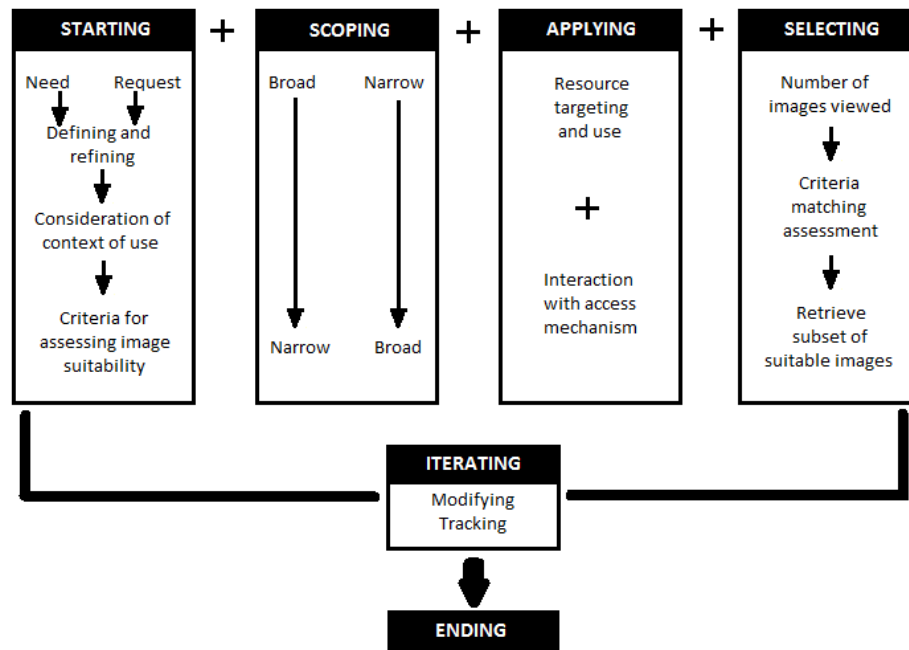
Figure 2: Conniss's Overview of Image Seeking (2000)

One point of difference in this study from Conniss's model is the behavior of professional users versus students. As noted by Hemmig, there are differences between the image seeking behaviors of professionals and students (2008). Students may often lack awareness of or be reluctant to use library resources. Bridges and Edmunson-Morton found that the majority of undergraduate novice researchers strongly preferred to search for images using Google, utilizing library resources only as a last resort, if at all (2011). Pisciotta, Dooris, Frost, and Halm report the results of an in-depth study of image needs, seeking, and use by faculty and students at Penn State, noting the variety of users and uses in academic settings (2005). The study finds differences in the usage of students and faculty, as well as differences between academic departments. Students often rely on external sources for images, such as databases. Some may also begin gathering a personal collection of images for future use (Pisciotta, et al, 2005).

Motivation may also play a role in image seeking behaviors. This is an important factor, as students are often driven by assignments, rather than personal motivations. In his thesis, Schlak conducted a study on the role of motivation in image searching and retrieval (2010). The search included a number of browser-based image retrieval tools, such as Google and Flickr. He found that browsing strategies are more often utilized when a user is motivated by leisure, while searching strategies correspond more strongly to information based motivations (Schlak, 2010).

Another key point in understanding user interactions with a retrieval system is an examination of the searching and browsing strategies used. Rorissa and Iyer conducted an in-depth examination of query terms and indexing terms, showing implications for browsing and searching in image retrieval (2008). The study categorized terms into different levels of generality (basic, superordinate, and subordinate), with the superordinate (or least specific) level most often used for searching (Rorissa & Iyer, 2008). However, Conniss found that the generality of terms used in image searches may depend upon the intended use of the image, the user's knowledge base of the image subject, or personal preference. Some users begin with a broad term, then narrow if necessary, while others begin with a narrow search, broadening if necessary (Conniss, 2008) In 2006, Matusiak studied information seeking behaviors based upon users' mental models of an image database's structure. Within the study, students (who were compared to community users) made more use of keyword searches than browsing. The students had more familiarity with searching than the community users, who preferred browsing. Like Conniss, Matusiak found that this background knowledge played a role in user behavior. However, the largest effect related to a user's background knowledge was satisfaction with the terms used to describe or index images within a system (Matusiak, 2006).

Research Questions

This study built upon previous, but limited research on image seeking behaviors. The focus of the study was on student image seeking behaviors within a digital collection and explored the following two questions:

1. How do students at the University of Denver seek images within Digital DU?

2. Are students at the University of Denver aware of Digital DU?

Participants

The participants for this study were recruited from PhD, Graduate, and Undergraduate students at the University of Denver. This population was chosen as they are potential users of Digital DU's image collections. Digital DU contains primary resources, such as historical maps, scanned letters, and archival images, which would be of particular interest to the student population.

In total, eight students participated in this study. One student dropped out of the study. There was minor data lost due to a technical error in the screen capture technology, thus Participant 4's data contains a small gap in the observational portion of Scenario 2.

There were four female and three male participants. The participants' ages were as follows:

21-30 years: 5 Participants

31-40 years: 1 Participant

41-50 years: 1 Participant

The study included three undergraduates, three graduates, and one PhD student. The participants' courses of study are shown in Table 1.

Table 1: Major by Academic Level

Academic Level	Major
Undergraduate	• History & English • Marketing & Psychology • Theater
Graduate	• Finance & Creative Writing • Library Science • Museum Studies
PhD	• Education

Research Method

The chosen method was a qualitative case study utilizing questionnaires, direct observation, and interviews. This approach allowed an examination of the students' thought processes as they browsed, searched, selected, and interacted with the Digital DU interface. This thought process was integral to understanding the underlying reasoning for image seeking behaviors displayed by the students.

Participants were asked to schedule a 30-45 minute session during which they were given an initial questionnaire (Attachment A), asked to complete three tasks within the collection (Attachment B), and answered follow-up interview questions (Attachment C).

The questionnaire (Attachment A) was used to gather demographic data as well as determine any prior use or awareness of Digital DU, thus addressing Research Question 2.

Research Question 1 was addressed through a combination of observation and interview in order to understand the thought processes and reasoning behind interactions with Digital DU's interface. Participants completed three tasks on Digital DU's website. Instructions for these tasks were read from a script (Attachment B). During the session, they were asked to describe their thoughts and actions using the think-aloud technique.

After the tasks were completed, participants were asked for clarification as to their

responses, choices, or decisions as necessary. A brief interview was then conducted with

each participant. After the session, any additional comments were solicited.

Sessions were recorded through audio and screen capture technology, using

Camtasia, with participant consent.

Findings

This study examined the participants' awareness and use of Digital DU, searching

and browsing behaviors, factors impacting searching and browsing, and feedback on the

functionality and appearance of Digital DU.

Awareness of Digital DU

Participants were evenly split in their awareness of and experience with Digital DU.

Four participants had never heard of Digital DU: two undergraduates and two graduates.

The participants were unable to determine Digital DU's purpose from the collection's name.

When asked "What do you think Digital DU is when you hear this phrase?" they gave the

following responses:

- o "A place where DU students can participate in creating Digital things? Or
   maybe online classes?"
- o "Something involving Computers, Programs or Software."
- o "The availability of DU Library resource in digital form."
- o "The aspects of DU that are digitalized. Or DU is pursuing an environment of
   digitalization."

Three participants had both heard of and used Digital DU: one undergraduate, one

graduate, and one PhD student. When asked how they had heard about Digital DU, what

resources they had used, and for what purposes, they gave the responses shown in Table 2

. **Table 2: Discovery and Use of Digital DU**

Academic Level	How did you hear about Digital DU?	What type(s) of resources have you used on Digital DU?	For what purpose did you use Digital DU?
Undergraduate	Class	• Photograph • Document • Audio or Video Record	Class resources.
Graduate	Class	• Photograph • Document • Audio or Video Record	• For info • To communicate with DU Community • To get/access my learning aids/resources
PhD	I'm aware that Digital DU is where dissertations and other DU-related resources are kept online.	• Document • Audio or Video Record	To locate and read other dissertations kept on Digital DU.

Two participants suggested better advertising for Digital DU.

- "I actually just found some stuff on my thesis for it, so I'm using it now… I would really have liked to known about this before my senior year."

- "It's nice, but I think maybe a little more promotion is needed."

Most of the participants had trouble understanding what kinds of resources Digital DU contained. After viewing the front page, three of the participants stated that they did not know what kinds of resources they could expect to find, one participant assumed Digital DU was a way to access library databases, and another assumed that Digital DU was strictly a collection of images. After using the site, four participants stated that Digital DU needed clarification of its contents. This sentiment was best summed up by Participant 2:

"You don't expect as much info as is here by looking at the home page. I would probably just bypass it… But then it's, like, huge. It's like opening the wardrobe and finding Narnia."

Searching and Browsing Behaviors

Digital DU facilitates both searching and browsing interactions. Searches may be

conducted in three ways: a keyword search, a search within titles for specific collections,

and an advanced search. A search box in the navigation bar provides keyword searches

through all materials contained within Digital DU. The results of this search are displayed

with a thumbnail of the resource (document, image, or otherwise), the title, and a

description. Facets are displayed to the right of the screen and are only visible if they are

applicable to the current search (Figure 3).

Figure 3: Keyword Search and Results Page (Digital DU, 2014)

Within a given collection, users may "Search within titles" (Figure 4). As suggested,

the search only addresses titles of objects in the collection and does not search within other

fields. Results are shown within the collection display, showing a thumbnail of the object,

title, and a brief description. There are no facets available, but the interface allows filtering

by all content, collections, or objects and sorting by title (A-Z or Z-A), oldest, or newest.
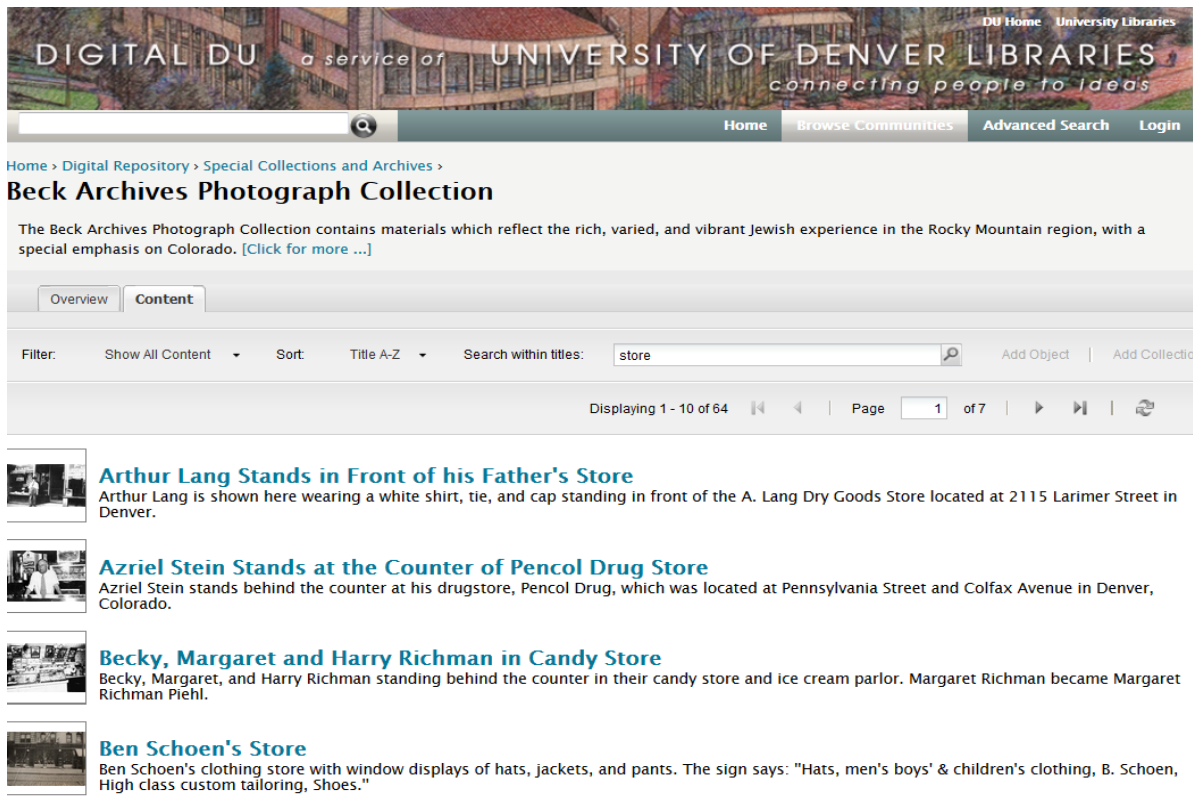

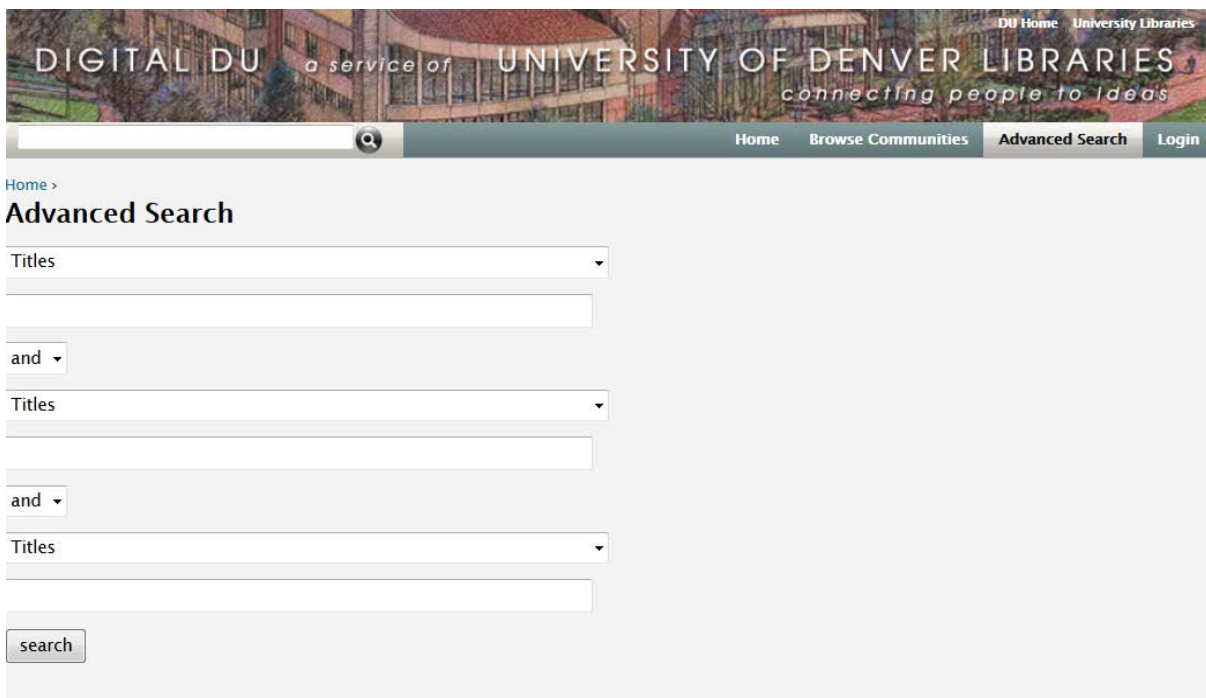**Figure 4: Search Within Titles (Digital DU, 2014)**

Figure 5: Advanced Search Interface (Digital DU, 2014)

Digital DU's advanced search (Figure 5) provides Boolean searching across nine fields: Titles, Description, Notes, Creators, Contributors, Dates, Subjects, Identifiers, and Full Text. Users may enter terms in three fields using "and" or "or." Search results are displayed in the same format as those from the navigation bar search box (Figure 3).

Browsing within Digital DU is provided through two avenues. First is through the home page (Figure 6). Featured images are shown in a scrolling section at the top right and two more are displayed at the bottom left. Six browsing categories (Beck Archives, Denver History, Faculty and Student Research, University Athletics, University Images, and University Libraries), further subdivided into 18 collections, are displayed in the remaining area of the home page.
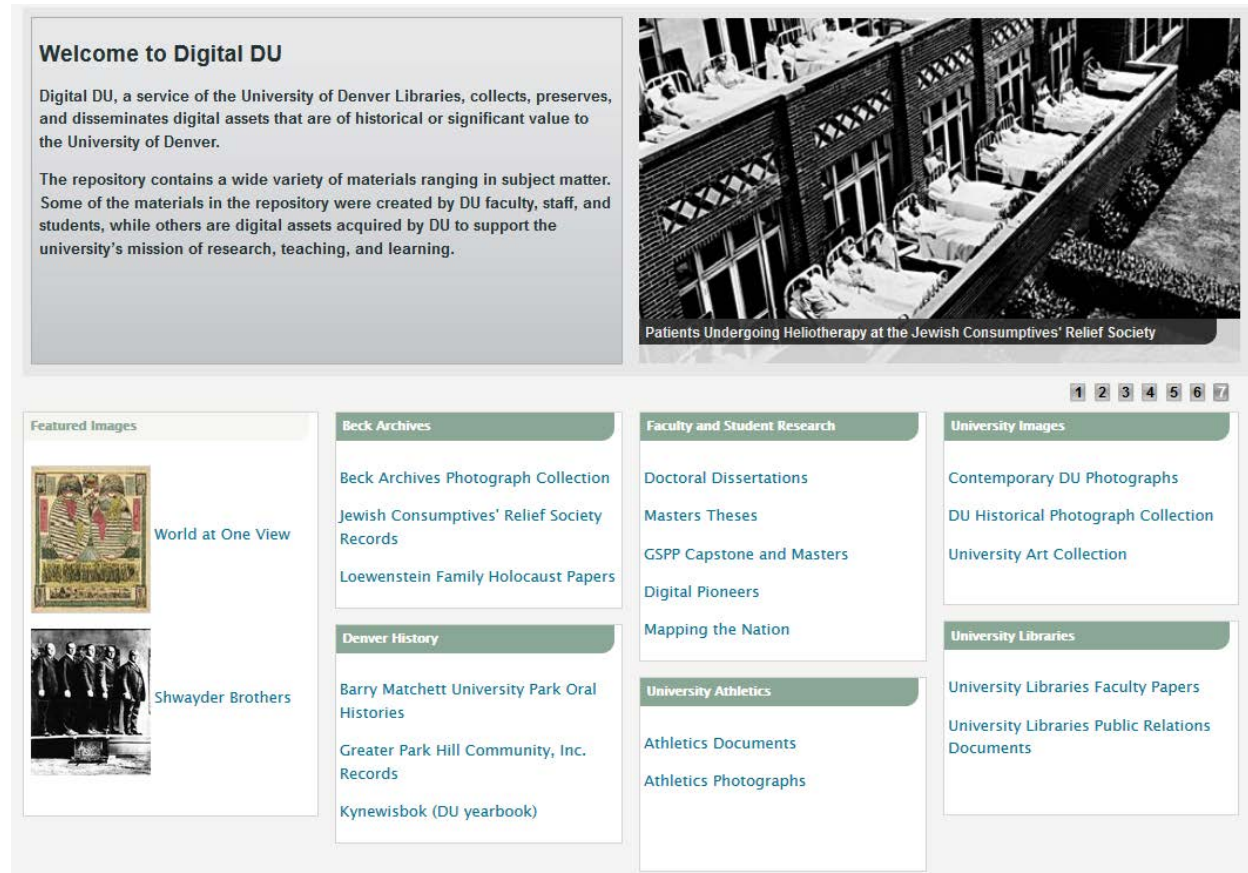

Figure 6: Home Page Browsing (Digital DU, 2014)

The second browsing pathway is through the "Browsing Communities" section from the navigation bar (Figure 7). This houses collections from various academic departments and divisions of the University of Denver. It is possible to either browse through a given collection or use the "Search within titles" interface. In the initial interface, a list of collections is shown with a brief description. The interior of the collections then shows a thumbnail, title, and description for each item.
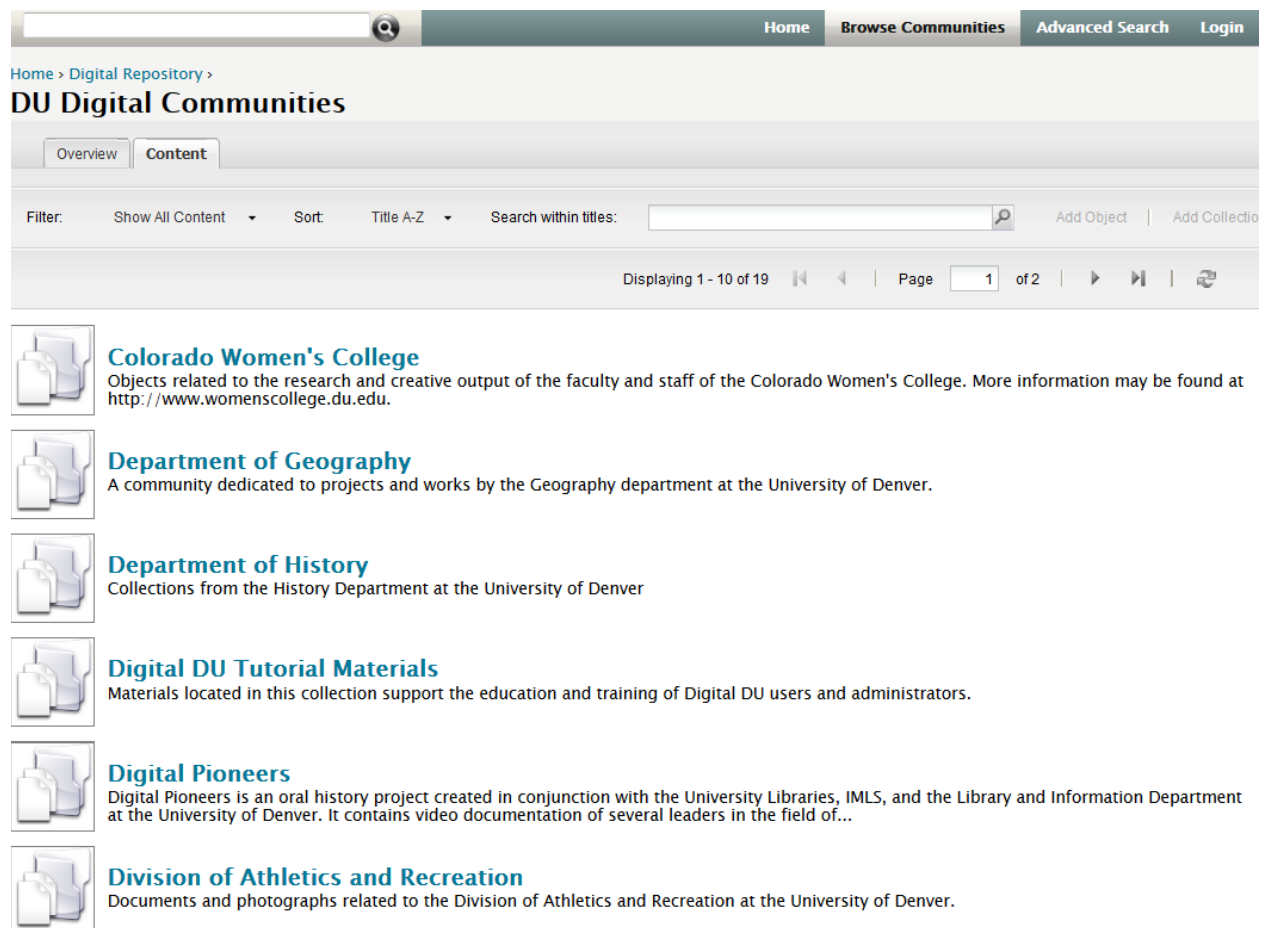

Figure 7: Browsing Communities (Digital DU, 2014)

Using these interfaces, Participants were asked to find three images within Digital DU for given scenarios. All three scenarios assumed an academic environment with an assignment from a professor which required the use of an image. Scenario 1 asked the participant to find a known item. Scenario 2 was a search for an unknown item with three

requirements: nationality of an individual within the image, location, and a date range for the creation of the image. Scenario 3 was also a search for an unknown item with the only requirement being a visual demonstration of a specific concept. The full scenarios are listed in Attachment B.

Scenario 1

Scenario 1 was a search for a known item. None of the participants completed the task in the same way, but all did find the item. One participant completed this task solely through browsing. Two participants began by browsing and then searched within the browsing collection: one found the result through searching and the other returned to browsing. Two participants completed the task through keyword searches. One participant began with a keyword search then moved to Advanced Search. The last participant completed the task using only an Advanced Search. Individual strategies are shown in Table 3, while participants' usage of searching and browsing features is shown in Figure 8.

Table 3: Strategies Used for Scenario 1 (Known Item Search)

Strategies Used for Scenario 1 (Known Item Search)	
Find map: "Density of Population, Compiled from 9th census" by Arthur de Witzleben, 1872.	
Participant	**Strategy Used:**
Participant 1	Browse → "Mapping the Nation" → Browse First Page → Select Item → View Metadata → Reject ← Return to "Mapping the Nation" → Search Within Titles → No Results ← Return Home Browse → "Mapping the Nation" → Browse Through Second Page → Select Item → End
Participant 2	Browse → "Mapping the Nation" → Search Within Titles → Browse Results → Select Item → End
Participant 3	Advanced Search → Browse Results → Select Item → View Larger Image → End
Participant 4	Search → No Results ➔ Modify Search → Browse Results → Not Found ➔ Modify Search → Browse Results → Select Item → End
Participant 5	Search → Browse Results → Not Found ➔ Modify Search → Browse Results → Select Item → End
Participant 6	Search → Browse Results → Not Found Advanced Search → Browse Results → Select Item → End
Participant 7	Browse → "Mapping the Nation" → Browse First Page → Select Item → End

Scenario 1: Searching and Browsing Feature Usage and Task Completion
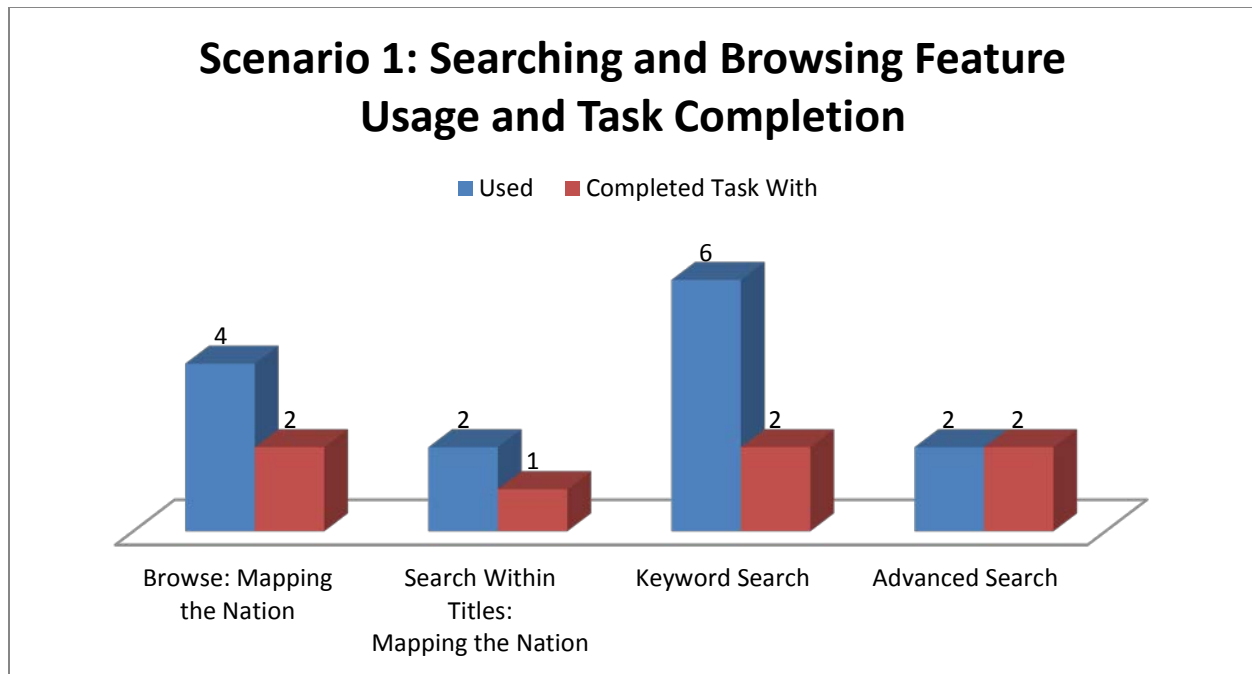
■ Used ■ Completed Task With

Figure 8: Scenario 1 Searching & Browsing Feature Usage and Task Completion

All participants who browsed for Scenario 1 used the same browsing collection, listed on the home page: Mapping the Nation. The searching criteria/keywords used by the participants who employed searching strategies are shown in Table 4. Two participants modified keywords for this search. In the initial search, the word "form" was used instead of "from" in both cases. The participants did not notice this error. Participant 5 modified the search with the correct spelling and added the author's last name. When the item was found, the participant assumed it was the addition of the author's name that had made the search successful. Participant 4 began the search with quotation marks around the title and modified the search to remove the quotation marks but the misspelled word was still present. The participant then searched for only the first three words of the title and found the item.

Also of note are the results of Participants 1 and 2. Both used the same search phrase in the collection-level "Search within titles." Participant 1, like Participant 4, included quotation marks in the search and received no results. The task was then finished through

browsing. Participant 2 did not include quotation marks and the target item was returned as the first result.

Table 4: Scenario 1 Search Terms (** Successful Search)

Scenario 1 (Known Item) Search Terms			
Find map: "Density of Population, Compiled from 9th census" by Arthur de Witzleben, 1872.			
Participant	**Search Within Titles** (w/in Collections)	**Keyword Search** (Navigation Bar)	**Advanced Search**
Participant 1	"density of population"		
Participant 2	Density Of Population **		
Participant 3			Titles: density of population compiled from 9th census AND Creators: Arthur de witzleben AND Dates: 1872 **
Participant 4		"density of population, compiled <u>form</u> 9th census" density of population compiled <u>form</u> 9th census density of population **	
Participant 5		density of population, compiled <u>form</u> 9th census density of population compiled from 9th Census de Witzleben **	
Participant 6	US history late 1800s		Titles: density of population compiled from 9th census **

Scenario 2

Scenario 2 was a search for an unknown item with three requirements: nationality of an individual within the image (Jewish), location (local), and a date range for the creation of the image (early-mid 1900s). All participants were able to complete Scenario 2, but one chose a video rather than a still image. Four participants began this Scenario by browsing, but only one completed the task through browsing. All of the participants used at least one search feature and five participants completed the task through searching. Only one participant completed the task using a single search. Participants' strategies for Scenario 2 are shown in Table 5 and usage of searching and browsing features is shown in Figure 9.

Table 5: Strategies Used for Scenario 2 (Unknown Item, Three Criteria)

| Strategies Used for Scenario 2 (Unknown Item, Three Criteria)	
Find: An image of local Jewish individuals in the early-mid 1900s.	
Participant	**Strategy Used:**
Participant 1	Browse → "Beck Archives Photograph Collection" → Search Within Titles → Browse Through Second Page → Select → End

Participant 2	Browse → "DU Historical Photograph Collection" → Browse First Page → Search Within Titles → No Results
	← Return Home
	
	Browse Communities → Department of History → Abandon
	← Return to Browse Communities → Abandon
	
	Advanced Search → No Results
	    → Modify Search → Browse Results → Select Item → View Metadata → Reject
	    ← Return to Results
	    Browse Results → Select Item → View Metadata → End

Participant 3	Browse → "Beck Archives Photograph Collection" → Abandon Advanced Search → No Results ← Return Home Browse → "Jewish Consumptives' Relief Society Records" → Browse First Page → Search Within Titles → No Results ← Return Home Browse → "Loewenstein Family Holocaust Papers" → Browse Through Second Page → Select Item → View Metadata → View Larger Image → End
Participant 4	Search → Browse Results → Abandon ← Return Home Browse → "Jewish Consumptives' Relief Society Records" → [Browsing Data Lost] → Select Item → Open New Window & Conduct Google Search on Name of Individual in Picture → Return to Item → View Metadata → End
Participant 5	Search → Browse Results → Select Item → View Metadata → End
Participant 6	Browse → Abandon Search → Browse First Page → Abandon ← Return Home Browse → Abandon Advanced Search → Browse First Page → Select Item → End (Selected Video)
Participant 7	Search → No Results → Modify Search → No Results ← Return Home Browse → "Beck Archives Photograph Collection" → Search Within Titles → No Results Advanced Search → Browse First Page → Use Facets "photographic print" and "still image" → Select Item → View Metadata → End
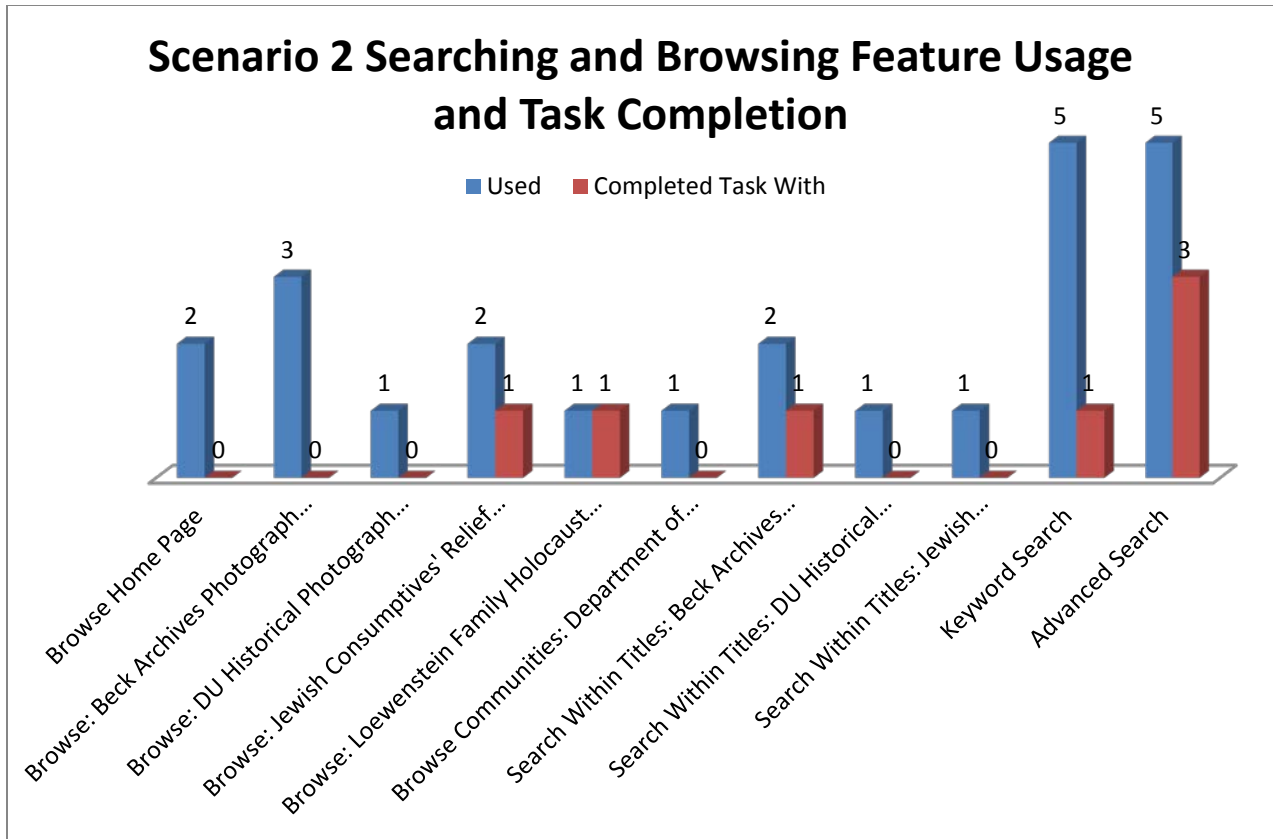
Figure 9: Scenario 2 Searching & Browsing Feature Usage and Task Completion

Six participants utilized Digital DU's browsing collections (Table 6). Three of the

participants chose to browse the "Beck Archives Photograph Collection." One searched

within this collection to complete the task. All three stated that this collection was chosen

because it had the word "Photograph" in the title. Two participants assumed this collection

would have Jewish individuals because the other two collections under the "Beck Archives"

heading, "Jewish Consumptives Relief Society Records" and "Loewenstein Family

Holocaust Papers," both addressed Jewish topics.

Two participants attempted to find a collection of historical photographs to browse.

Participant 2 looked under the "DU Historical Photograph Collection" and went through the

"Browse Communities" tab to the "Department of History." Neither strategy was successful.

Participant 6 did not go past the home page, but actively looked for "World History" and

"Denver History" collections. When neither was found, the participant changed strategies

and abandoned browsing.

Participants 3 and 4 used data from alternative sources to confirm the requirements

of the scenario were met. Participant 3 used an in-depth method to find an image within the

"Loewenstein Family Holocaust Papers" collection. The collection description was read to

determine which individuals in the Loewenstein family were of Jewish heritage. The

participant then browsed the collection to find an image of one of those individuals.

Participant 4 found an image of an individual within the "Jewish Consumptives' Relief

Society Records" and used a Google search to confirm that the individual was of Jewish

heritage and resided in Denver within the required time frame.

Table 6: Scenario 2 Browsing Collections (** Successful Browse)

Scenario 2 Browsing Collections	
Find: An image of local Jewish individuals in the early-mid 1900s.	
Participant	**Browsing Collection Selected**
Participant 1	Beck Archives Photograph Collection **
Participant 2	DU Historical Photograph Collection Browse Communities -> Department of History
Participant 3	Beck Archives Photograph Collection Jewish Consumptives' Relief Society Records Loewenstein Family Holocaust Papers **
Participant 4	Jewish Consumptives' Relief Society Records **
Participant 6	Looked for "World History" section to browse. Looked for "Denver History" section to browse.
Participant 7	Beck Archives Photograph Collection

All participants utilized at least one of Digital DU's search features (Table 7). Four

participants searched within browsing collections, but only Participant 1 completed the task

this way. Three participants completed the task using the Advanced Search feature and

one completed it using a single keyword search. Only two participants modified their

searches. Five participants conducted unsuccessful searches and all five switched to

browsing after the search failed. Of these, two completed the task through browsing and

three returned to searching to complete the task.

Scenario 2 (Unknown Item, Three Criteria) Search Terms			
Find: An image of local Jewish individuals in the early-mid 1900s.			
Participant	Search Within Titles (w/in Collections)	Keyword Search (Navigation Bar)	Advanced Search
Participant 1	Colorado **		
Participant 2	Jewish History		Description: Jewish AND Dates: 1900-1950 AND Description: Colorado Description: Jewish AND Dates: 1900 AND Description: Colorado **
Participant 3	photographs		Description: jewish individuals photographs AND Dates: 1900s
Participant 4		jewish history colorado	
Participant 5		Jews in Colorado 1900s **	
Participant 6		jewish history in Colorado	Title: jewish individuals in in Colorado **
Participant 7	jewish individuals in the early-mid 1900s	local jewish idvidals in the early-mid 900s local jewish individuals in the early-mid 900s	Title: local jewish individuals ■ Facet: Photographic Print ■ Facet: Still Image **

Scenario 3

      Scenario 3 was a search for an unknown item with a very specific requirement: an image that visually demonstrated the impact of tuberculosis on Colorado's Jewish community. All participants were able to complete the task. Three participants began by browsing. One completed the task through browsing and used no search features. All other participants used at least one search feature and two participants completed the task with a single search. The participants' searching and browsing strategies for Scenario 3 are shown in Table 8 and usage of searching and browsing features is shown in Figure 10.

<div align="center">Table 8: Strategies Used for Scenario 3 (Unknown Item, Specific Concept)</div>

Strategies Used for Scenario 3 (Unknown Item, Specific Concept)	
Find: An image that visually demonstrates the impact of tuberculosis on Colorado's Jewish community.	
Participant	**Strategy Used:**
Participant 1	Browse → "Beck Archives Photograph Collection" → Search Within Titles → No Results ➔ Modify Search → Browse Results → Select Item → End
Participant 2	Advanced Search → No Results ➔ Modify Search → Browse Results → Select Item → View Metadata → Reject ← Return to Results → Browse Results → Select Item → View Metadata → View Larger Image → End
Participant 3	Browse → "Jewish Consumptives' Relief Society Records" → Browse First Page → "Show Only Objects" → Browse First Page → Select Item → View Larger Image → View Metadata → Reject ← Return to "Jewish Consumptives' Relief Society Records" First Page → Browse Through Six Pages → Select Item → View Metadata → View Larger Image → Reject ← Return to Page Six → Browse Through Page Nine → Select Item → View Larger Image → End
Participant 4	Search → Browse First Page of Results → Select Item → View Metadata → View Larger Image → End
Participant 5	Search → Browse First Page of Results → Select Item → View Metadata → View Larger Image → End
Participant 6	Search → Browse Results → No Selection ➔ Modify Search → Browse First Page of Results → Select Item → View Metadata → View Larger Image → End
Participant 7	Browse → "Beck Archives Photograph Collection" → Search Within Titles → No Results Advanced Search → Single Result → Select Item → View Metadata → View Larger Image → End
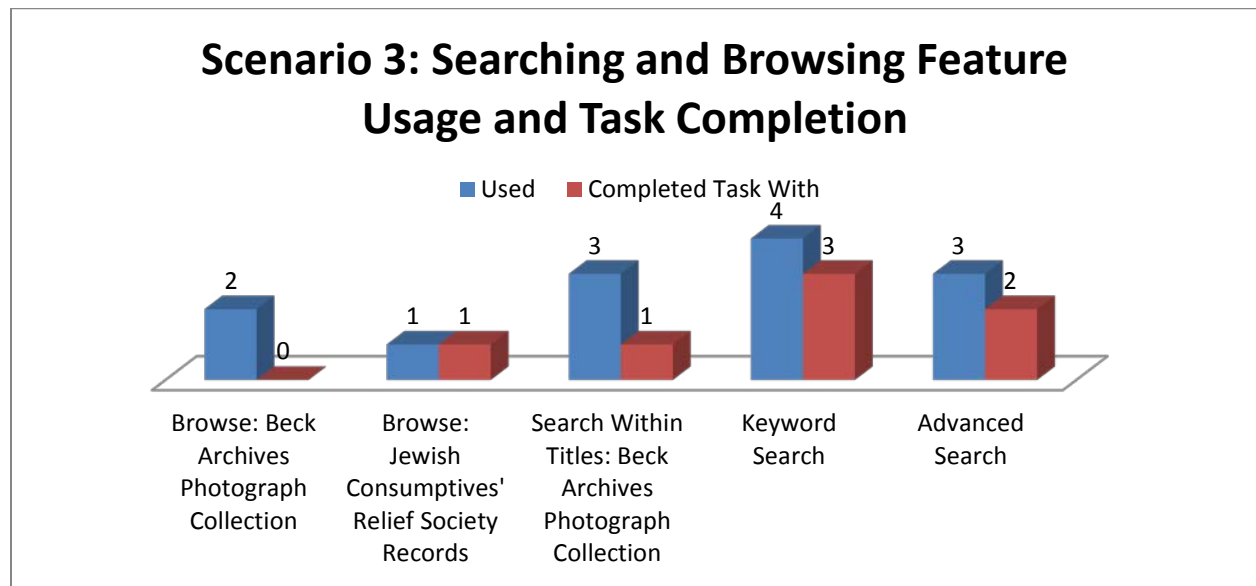
Figure 10: Scenario 3 Searching & Browsing Feature Usage and Task Completion

Three participants utilized Digital DU's Browsing Collections (Table 9). Participants

1 and 7 began in the "Beck Archives Photograph Collection" and searched within the

collection's titles. Participant 1 completed the task through this method.

Table 9: Scenario 3 Browsing Collections (** Successful Browse)

Scenario 3 Browsing Collections	
Find: An image that visually demonstrates the impact of tuberculosis on Colorado's Jewish community.	
Participant	**Browsing Collection Selected**
Participant 1	Beck Archives Photograph Collection **
Participant 3	Jewish Consumptives' Relief Society Records **
Participant 7	Beck Archives Photograph Collection

Participant 3 completed this scenario using only browsing within the "Jewish

Consumptives' Relief Society Records." Nine pages of images were browsed before one

which the participant believed "sufficiently demonstrated impact" was chosen.

Table 10: Scenario 3 Search Terms (** Successful Search)

Scenario 3 (Unknown Item, Specific Concept) Search Terms			
Find: An image that visually demonstrates the impact of tuberculosis on Colorado's Jewish community.			
Participant	**Search Within Titles** (w/in Collections)	**Keyword Search** (Navigation Bar)	**Advanced Search**
Participant 1	"tuberculosis" and "Colorado" tuberculosis **		
Participant 2			Description: Jewish AND Identifiers: Tuberculosis AND Description: Colorado Description: Jewish AND Subjects: Tuberculosis AND Description: Colorado **
Participant 4		tuberculosis **	
Participant 5		tuberculosis jews **	
Participant 6		Tuberculosis on Colorado jewish community Colorado jewish tuberculosis **	
Participant 7	tuberculosis on colorado's jewish community		Titles: tuberculosis AND Titles: colorado's jewish community **

Six participants completed the task using Digital DU's searching features (Table 10). Three completed the task using keyword searches, two used Advanced Search, and one searched within a browsing collection. Two participants used only a single search. The remaining participants had one failed search and completed the task by modifying the search or moving to Advanced Search.

Factors in Searching and Browsing

After completing the scenarios, participants were asked about the factors they considered while selecting an image, what metadata was most useful during searching or browsing, whether they preferred searching or browsing for each scenario, and if the results they received were what they had expected. The full interview script is in Attachment C.

Selection Factors & Metadata Usage

Each participant was asked what factors and metadata elements they considered in selecting images. The answers included both general factors and factors specific to each scenario. When speaking of the general factors in image selection (Figure 11), the participants all assumed an academic environment. Three participants said that ensuring their selection encompassed the entire assignment was an important factor. One also stated that the specificity of the assignment affected the final selection. Two participants said that keywords within the assignment were the most important factors in selection.

The professor and course were also important factors. Participants said that the quirks of a professor would affect selection. For example, the professor's interests, grading style, and usual expectations would be taken into consideration. The class may also be a factor in selection. One participant said they may choose differently based on the type of class, the possibility of using a selection for multiple assignments, a theme of assignments in the class, or possible application of the selection towards a final project.

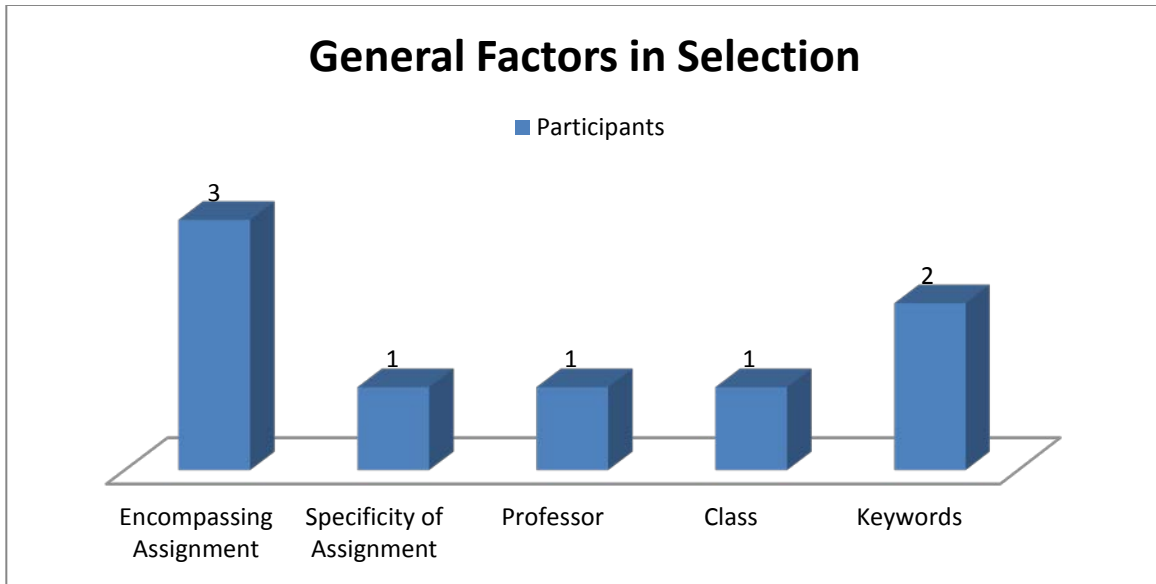**General Factors in Selection**

Figure 11: General Factors in Selection

In Scenario 1, the known item search, participants were focused on the target item as the final factor of selection. As shown in Figure 12, three participants said the title was the most important factor. Three others stated that the item itself was most important. One participant said that the fact the item was a map was most important because that allowed them to know where to find the item. When asked what metadata was most useful in searching for this item, all participants said the title was most important (Figure 13). Three participants used date and two used creator to ensure the selection was the correct item.

Selection Factors Scenario 1

Use of Metadata Scenario 1
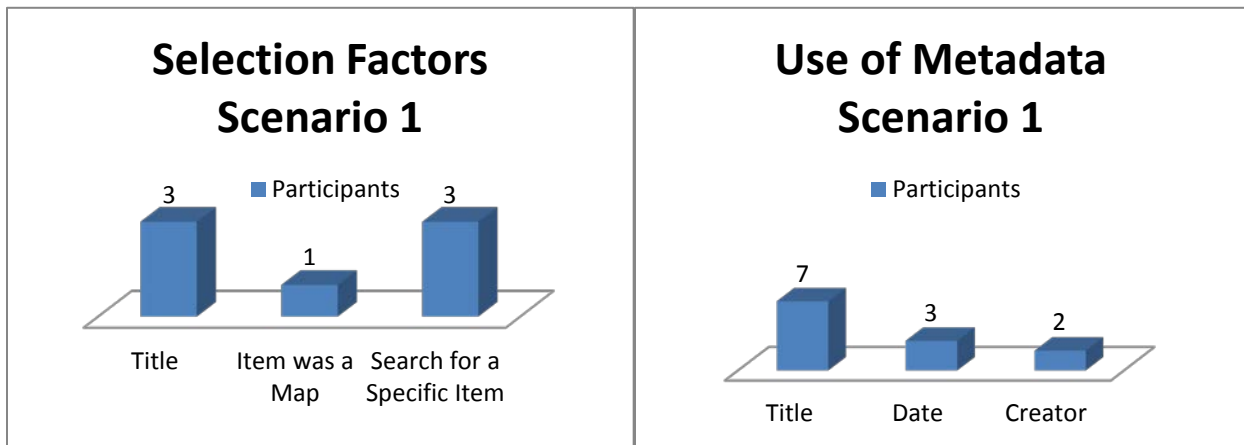
Figure 12: Selection Factors - Scenario 1   Figure 13: Use of Metadata - Scenario 1

Scenario 2 was a search for an unknown image of local Jewish individuals from the early-mid 1900s. As shown in Figure 14, participants were evenly divided among three factors as most important to selection: keywords in the assignment, date of the image, and the ethnicity of a person in the image. One participant stated that the most important factor was that this was a broad search for any Jewish individual, which allowed selection from among a variety of images.

The use of metadata in this scenario was more varied than in the known item search (Figure 15). Five participants said they used the title. Date and description were each used by four participants. The participants who used the date said this was to ensure the image was from the early-mid 1900s as stated in the scenario. The description was used by one participant to determine if the ethnic background of individuals in the image was Jewish and by another participant to discover the location where the image had been taken. One participant used the subject field to determine the ethnicity of individuals in the image. One also used the location field to ensure that the image had been taken locally. Format was used by one participant to determine if the image was a photograph or a drawing.
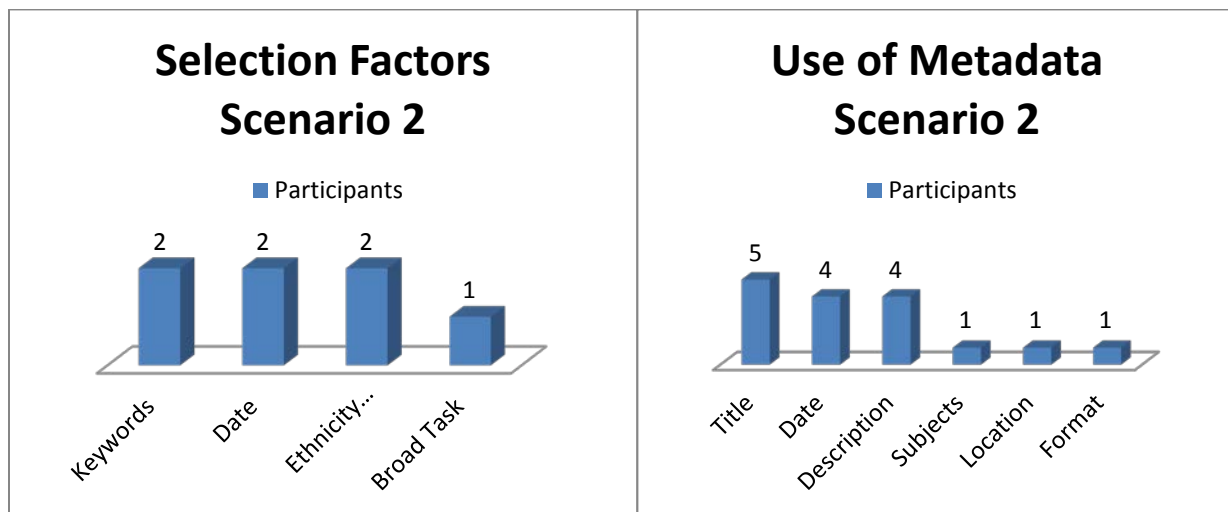
Figure 14: Selection Factors - Scenario 2   Figure 15: Use of Metadata - Scenario 2

Scenario 3 asked participants to find an image which visually demonstrated part of the impact of tuberculosis on Colorado's Jewish community. One participant again stated that the broadness of this scenario was the most important factor in selection. The remaining participants were equally divided among three important factors in selecting an image for this scenario: keywords given in the scenario, content of the image, and impact of the image (Figure 16). Content and impact were similar, but slightly differing, concepts. The two participants who were looking at an image's content stated that the image should contain patients, hospital rooms, buildings, or rehab sites. They were seeking a visual of numbers and values on a large scale. The participants who stated impact was the most important factor were more interested in finding something emotional and personal, such as the facial expression of a photographed individual or a handwritten letter on behalf of a family member.
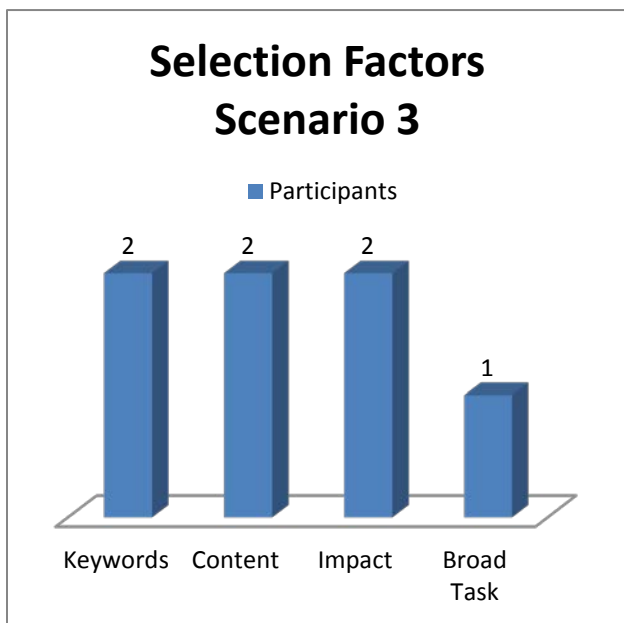
Figure 16: Selection Factors - Scenario 3
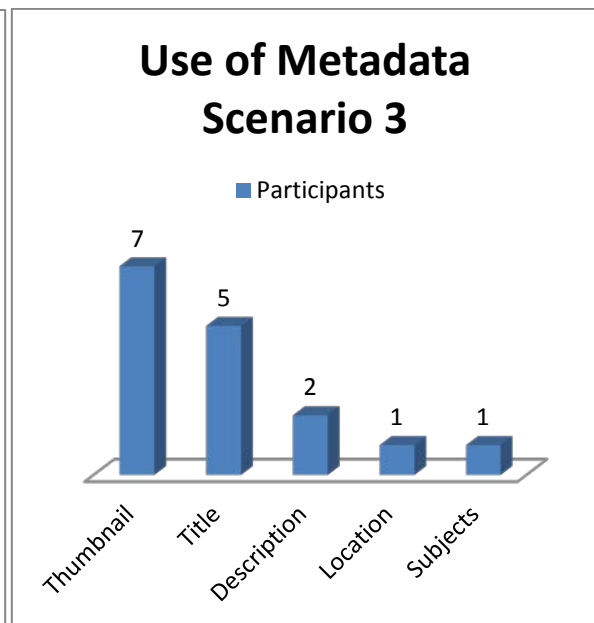
Figure 17: Use of Metadata - Scenario 3

In this scenario, the thumbnail was used more heavily than metadata elements (Figure 17). All seven participants stated that the thumbnail was important. Five participants also relied on the title as an important piece of information. Two participants used the description to determine if an image included a tuberculosis patient. One used the location field to ensure that the image had been taken in Colorado. The subject field was also used by one participant to determine that the image was both of a Jewish patient and that the patient had suffered from tuberculosis.

<u>Searching or Browsing Preference</u>

After determining what factors were most important during selection, the participants were asked whether they would prefer to search or browse for each scenario. As in many other studies, the participants stated preferences differed from their actions while seeking images. This variance between preferences and practices is shown in Table 11.

For Scenario 1, the known item, all participants said they would prefer to search for the target item. Four participants did search for the item, but two found it through browsing and one by searching within a browsing collection.

In Scenario 2, an unknown item with three criteria, three participants said they would prefer browsing, two said searching, and two said they would search, then browse, then search/narrow again. Of those who said they would prefer browsing, one completed the task through browsing, one started by browsing and completed the task through searching, and one started by searching and completed the task through browsing. The two who said they would prefer searching both switched between searching and browsing, but did complete the task through searching. The participants who said they would search, then browse, then search did follow their stated pattern. Both began by searching. One participant received no results and completed the task through browsing. The other participant browsed through the returned results and selected an item.

Table 11: Preference vs. Practice

Preference vs. Practice				
Participant		**Scenario 1**	**Scenario 2**	**Scenario 3**
P1	Pref	Search	Browse	Browse

	Prac	1. Looked for Search Box - Unfound
		2. Browsed
		   a. Searched Within Titles
		      i. No Results
		3. Browsed
		   a. Found
			1. Looked for Search Box - Unfound
			2. Browsed
			   a. Searched Within Titles
			      i. Browsed Results
			         1. Selected
				1. Browsed
				   a. Searched Within Titles
				      i. No Results
				   b. Modified Search
				      i. Browsed Results
				         1. Selected

P2	Pref	Search	Browse	Search

	Prac	1. Browsed
		   a. Searched Within Titles
		      i. Browsed Results
		         1. Found
			1. Browsed
			   a. Searched Within Titles
			      i. No Results
			2. Browsed
			   a. No Selection
			3. Advanced Search
			   a. No Results
			4. Modified Search
			   a. Browsed Results
			      i. Selected
			         1. Reject
			   b. Browsed Results
			      i. Selected
				1. Advanced Search
				   a. No Results
				2. Modified Search
				   a. Browsed Results
				      i. Selected
				         1. Rejected
				   b. Returned to Browse Results
				      i. Selected

P3	Pref	Search	Search, then Browse, then Search	Search, then Browse, then Search

	Prac	1. Advanced Search
		   a. Browsed Results
		      i. Found
			1. Advanced Search
			   a. No Results
			2. Browsed
			   a. Searched Within Titles
			      i. No Results
			3. Browsed
			   a. Selected
				1. Browsed
				   a. Selected
				      i. Rejected
				2. Returned to Browse
				   a. Selected
				      i. Rejected
				3. Returned to Browse
				   a. Selected

P4	Pref	Search	Browse	Search, then Browse

	Prac	1. Searched
		   a. No Results
		2. Modified Search
		   a. Browsed Results
		      i. Not Found
		3. Modified Search
		   a. Browsed Results
		      i. Found
			1. Searched
			   a. Browsed Results
			      i. No Selection
			2. Browsed
			   a. Selected
				1. Searched
				   a. Browsed Results
				      i. Selected

P5	Pref	Search	Search, then Browse, then Narrow	Search, then Browse, then Narrow

	Prac	1. Searched
		   a. Browsed Results
		      i. Not Found
		2. Searched
		   a. Browsed Results
		      i. Found
			1. Searched
			   a. Browsed Results
			      i. Selected
				1. Searched
				   a. Browsed Results
				      i. Selected

P6	Pref	Search	Search	Search

	Prac	1. Searched
		   a. Browsed Results
		      i. Not Found
		2. Searched
		   a. Abandoned
		3. Advanced Search
		   a. Browsed Results
		      i. Found
			1. Browsed
			   a. Abandoned
			2. Searched
			   a. Browsed Results
			      i. No Selection
			3. Browsed
			   a. Abandoned
			4. Advanced Search
			   a. Browsed Results
			      i. Selected
				1. Searched
				   a. Browsed Results
				      i. No Selection
				2. Modified Search
				   a. Browsed Results
				      i. Selected

P7	Pref	Search	Search	Search

	Prac	1. Browsed
		   a. Found
			1. Searched
			   a. No Results
			2. Modified Search
			   a. No Results
			3. Browsed
				1. Browsed
				   a. Searched Within Titles
				      i. No Results
				2. Advanced Search
				   a. Browsed Results

			a. Searched Within Titles i. No Results 4. Advanced Search a. Browsed Results i. Selected	i. Selected

Scenario 3 was also a search for an unknown item, but with a very specific conceptual requirement. Only one participant said they would prefer to browse for this scenario. This participant did begin by browsing then completed the task by searching within the browsing category. Three participants said they would prefer to search. Two of these participants completed the task through searching. The third began by browsing then completed the task through searching. The remaining three participants said they would search, then browse, then search/narrow again. Two of these participants did search, browse the results, and select an item. The third completed the task solely through browsing.

Overall, only one participant accurately matched their preferences to their demonstrated searching and browsing in all three scenarios. Two more participants accurately matched the method with which they eventually completed the task.

Expectations

The participants were then asked if the results of their searching and browsing attempts were what they had expected. The responses were separated by browsing and searching attempts.

When asked what they expected from their searches, the participants tended to separate Scenario 1 (known item) and group their expectations for Scenarios 2 and 3 (unknown items). All six participants who searched for Scenario 1 expected to find the target item. As shown by Figure 18, four participants said they got exactly what was expected from their searches. Two participants said they were not expecting the results they received. The first of these participants used quotations in the keyword search box,

which returned no results. The other participant misspelled a word in the title and received

results, but not the expected item.
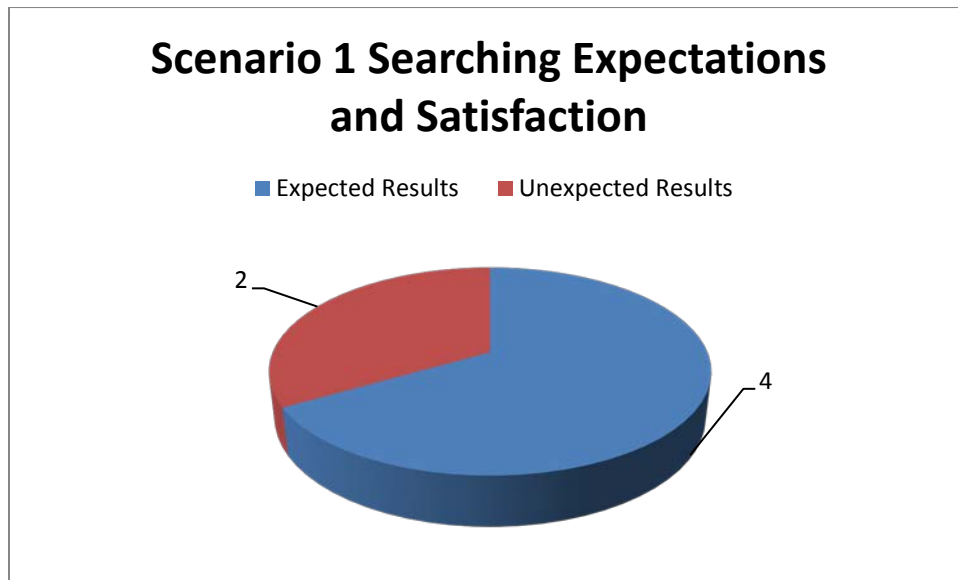
Figure 18: Scenario 1 Searching Expectations and Satisfaction

In Scenario 2, every participant searched at least once. Two participants were

expecting to get back items related to their keywords. One participant was expecting

images of clubs or organizations. The remaining four were unsure what to expect. Three of

these participants stated that they did not know what search terms to use in this system or

whether they overlapped with the library's terms and were therefore unsure of the results

their searches would supply. The fourth participant said they expected to get results which

were unexpected due to individual use of search terms and thus did not know what to

expect.

Two participants said they got exactly what they were seeking, as shown in Figure

19. Two more stated that the results were unexpected, but better than what they had

expected. Two said that their results were unexpected. Both participants were confused

over the search terms used within Digital DU and stated this as the cause of the unexpected

results. For instance, both were uncertain whether they should use Jew, Jews, Jewish, or

Jewish individuals to find images of Jewish people. The last participant was unsure whether the results matched what had been expected.

Scenario 2 Searching Expectations and Satisfaction

■ Expected Results   ■ Unexpected, Better Results

■ Unexpected Results   ■ Unsure

Figure 19: Scenario 2 Searching Expectations and Satisfaction

The expectations for Scenario 3 were largely combined with those from Scenario 2 by the participants. Six participants searched for this scenario. Two expected results related to their keywords. One participant expected images of funerals or hospital rooms. The remaining three participants were unsure what to expect. All three were unsure of their search terms.

One participant received exactly what they expected (Figure 20). Two participants again received results which were better than they expected. Two participants had unexpected results. One of these had been using quotes and Boolean expressions in the keyword search and received no results. After discovering that the system did not support those features, the search improved. The other participant again stated that confusion over keywords resulted in unexpected items. The last participant was unsure if the returned items matched their expectations.

Scenario 3 Searching Expectations and Satisfaction

- ■ Expected Results
- ■ Unexpected, Better Results
- ■ Unexpected Results
- ■ Unsure

Figure 20: Scenario 3 Searching Expectations and Satisfaction

Browsing expectations were more confused than those of the searches. The

majority of the participants did not know what to expect when browsing, as indicated in

Figure 21. They were unable to determine what types or categories of materials would be

in the browsing collections. Of the six participants who utilized Digital DU's browsing

capabilities, one participant found resources where expected. The other five stated that

they were unsure what the categories contained. Four participants were pleasantly

surprised by the amount and variety of resources, but said they would never have known

these were available by looking at the site.

Category and collection titles caused a great deal of confusion among participants,

though it was generally appreciated that the titles were short. Three participants specifically

stated that they would not have guessed the "Beck Archives Photograph Collection"

contained Jewish historical materials. Two participants said they did not expect to find

anything other than documents within the categories labelled "Papers" or "Records." Four

participants also expected to find images only within collections that had the word

"Photograph" in the title. One participant was unsure of the differences among the

University sections and the "Denver History" section, since the DU Yearbook was included

under "Denver History" instead of within any of the University categories. Two participants

were also unsure what the "Browsing Communities" were.

Browsing Expectations

■ Images only in Collections Labeled "Photographs"

■ Only Documents in Collections Labelled "Papers" or "Records"

■ Can't Tell What Categories Contain

■ Don't Know What Browsing Communities Means
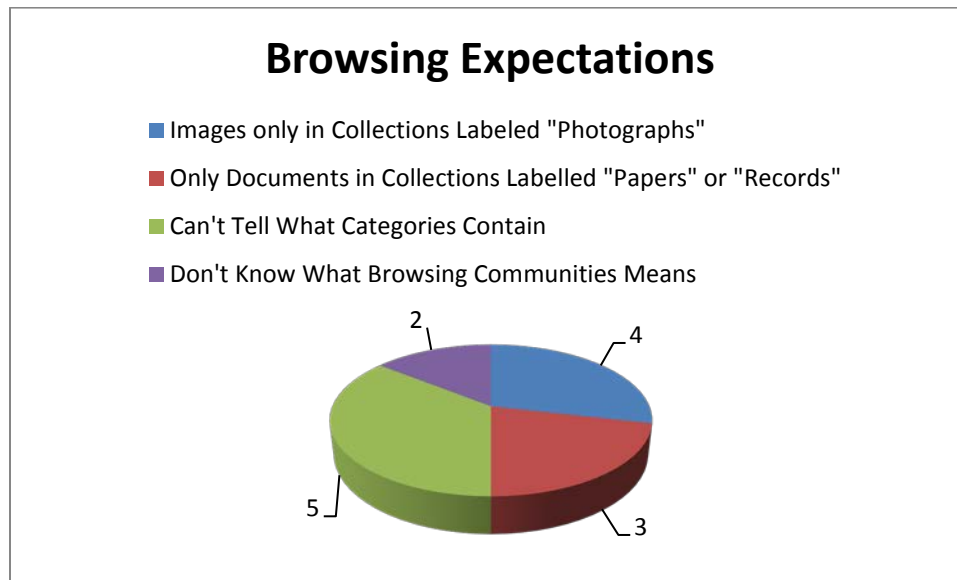
Figure 21: Browsing Expectations

Features, Appearance, and Comments

The final interview questions asked for feedback on the features and appearance of

Digital DU, along with any additional comments. All of the participants were pleased with

the amount of resources available within Digital DU. Overall, participants were satisfied

with the functionality of the system. They said it was effective, simple, functional, and easy

to use. Several suggestions were made for ways to improve the system:

- Clarify the contents of the browsing collections (5 Participants)

- Search by format within the Advanced Search (4 Participants)

- Add facets to the "Search within titles" feature (2 Participants)

- Add spell checking to all searches with a "did you mean" feature (2

  Participants)

- Add examples to the Advanced Search page, with an explanation of usable symbols, if any, such as quotes (2 Participants)

- Clarify whether search terms overlap with those of the library (2 Participants)

- Clarify the differences among Description, Subjects, and Identifiers in the Advanced Search (1 Participant)

- Display a larger image when hovering over a thumbnail (1 Participant)

While no suggestions were made, several participants also expressed confusion over some features. Two were confused by the usage of the "Title A-Z" within the collections, thinking it would allow them to select and jump to a letter rather than change sort order. Two participants were also confused by the "Login" button, since there was no explanation of what the login would be needed for.

Feedback about Digital DU's appearance also had both positive and negative reactions. Participants liked the scrolling featured images, the layout of the navigation, and the general layout of the page. They had the following comments for improvement:

- Boring or drab colors (6 Participants)

- Text is too small (3 Participants)

- Welcome takes up too much space (2 Participants)

- Align browsing category boxes (1 Participant)

- Why are there two sections of featured images? (1 Participant)

- Make the search and advanced search stand out more (1 Participant)

Additional comments were given last. There were very few, but the participants mostly stated the same things. They were surprised about Digital DU's content, considered it a good resource, were satisfied with the FAQs, and appreciated the copyright information. The additional suggestions all focused on the same two points:

- Better advertising

- Better explanation of what Digital DU is about

Discussion

The findings of this study both supported the previous research and displayed several trends of interest. The image seeking behaviors of the participants followed the model presented by Conniss (2000) and were subject to context as noted by Wilson (2000). Three of the participants clarified that their searches were "what they would do for a class." They noted that they might do more in depth searching if these had been real assignments. Two also stated that they used different methods when seeking images for non-school purposes, usually browsing more often because it was more fun. This supports Schlak's findings about the differences between leisure and non-leisure activities (2010).

The behaviors also showed differences based on task. When seeking a known item, the majority of participants chose to search. There was little use of either the thumbnail or the metadata once the correct title had been located.

The second and third scenarios (both searches for unknown items) showed two variations in behavior: pattern of searching and use of thumbnails/images or metadata. In the second scenario, participants chose to browse more often, with only one participant who used only searching strategies. The six participants who used both searching and browsing tended to cycle between the two. If a search failed, they would try browsing, then searching again, then browsing again, etc. When evaluating a selected image, the participants often made use of the metadata to verify its applicability to the assignment. Only one participant viewed the image, itself.

Scenario 3 showed almost opposite strategies. The majority of participants chose to search for this scenario, with only one who completed the task solely by browsing. Two

participants began by browsing, but switched to searching. Four only searched. Unlike Scenario 2, the participants tended to modify a search when it failed or move to an advanced search. They never switched back to browsing. When evaluating an image, the image was always viewed, both as a thumbnail and at full size. The metadata was still used, but to a lesser extent than in Scenario 2.

When asked about the differences between Scenarios 2 and 3, participants said they felt that Scenario 3 was more specific than Scenario 2. In Scenario 2, they were more concerned that the content of the image matched the three elements required by assignment: ethnicity, location, and date. All of these could be determined by viewing an image's metadata. While the requirements are specific, the participants stated that this was a very broad task because it could be any image of a person as long as those three criteria were met.

In contrast, Scenario 3 required the inclusion of a non-concrete concept. Like Scenario 2, the image still needed to be both local and related to the Jewish community. However, the assignment required a demonstration of an impact on that community by tuberculosis. The participants felt this was a far more specific task, though none said why. All felt it necessary to view the thumbnail in order to determine an image's relevance for the scenario.

Participant 7 stated that the usage of the thumbnail depended on the question. When searching for something that couldn't be identified by sight, the thumbnail was less important. This was equated to Scenario 2, since the participant could not identify a Jewish individual, date, or location by sight. The thumbnail was only important "when you know what you're looking for." In Scenario 3, this was related to the concept of impact, which the participant deemed recognizable on sight.

Overall, the remaining findings fell in line with the previous research. The search terms used by the participants tended to fall into the superordinate category described by Rorissa and Iyer (2008). Modifications to the search terms were minor and usually broadened the search. As in Matusiak's study (2006), the students showed a preference for searching over browsing. Students with a greater knowledge of the subject had greater confidence in their search terms and also questioned the system's use of search terms most often.

The participants' browsing behaviors were widely varied. Some were in-depth browses, while others were abandoned after viewing a single image. There was no discernable pattern in this behavior, often varying for the same participant.

Conclusion

This study examined the participants' awareness and use of Digital DU, searching and browsing behaviors, factors impacting searching and browsing, and feedback on the functionality and appearance of Digital DU. It was discovered that participants were evenly split on their awareness of Digital DU, but that few knew the types of resources which were offered. Even the participants who had used Digital DU stated that additional promotion and clarification of the contents was needed.

The participants' searching and browsing behaviors followed the models set forth by Wilson (2000) and Conniss (2000). A difference in the patterns of searching was noted between the two unknown item searches, possibly suggesting a behavior based on either specificity or abstractness. The factors impacting searching and browsing behaviors also generally followed the previous research. The environment, assignment, professor, and specificity of the task were all stated as general factors in selecting images. The factors in specific scenarios varied, as did the usage of thumbnails and metadata in selection.

After searching, participants were evenly split as to whether their expectations had been met by the search results. In some cases, unexpected results were positive. The majority of participants were unsure what to expect when browsing. This was largely due to confusion over the contents of the browsing collections.

Feedback solicited from the participants showed an overall approval of Digital DU's content, functionality, and layout. Participants suggested the addition of several features, visual improvements, and tactics. The most prominent of these were the ability to search by format, clarification on Digital DU's contents, spell checking, brighter colors, larger text, and promotion.

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Attachment A: Questionnaire

Participant # _____

Image Seeking Behaviors Questionnaire

1) DU Affiliation (circle one)

   PhD   Graduate   Undergraduate   Other _____

2) Major _____

3) Age (circle one)

   ≤20   21-30   31-40   41-50   51-60   61-70   ≥71

4) Gender (circle one)

   Male   Female   Other

5) Have you ever heard of Digital DU? (circle one)

   Yes (Skip to Question 7)   No (Stop after Question 6)

6) What do you think Digital DU is when you hear this phrase?

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7) If so, how?

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8) Have you ever used Digital DU? (circle one)

   Yes   No (Ignore remaining questions)

9) For what purpose did you use Digital DU?

10) What type(s) of resources have you used on Digital DU? (circle all that apply)

a) Photograph   b) Document   c) Audio or Video Record   d) Other (List below)

_____

<u>**Attachment B: Observation Script & Scenarios**</u>

Participant # _____

Observation Script & Scenarios

Thank you for your participation. During this session I will ask you to complete three tasks on the Digital DU website. The goal of this study is to understand how people search for images on this website. There are no right or wrong answers and you will in no way be judged on these tasks. My goal is simply to understand the process. Please verbalize your thought process as you go through each task.

(If Participant consented to audio recording.)

This session will be using audio recording and screen capture technology.

Do you have any questions before we begin?

Scenario 1

Your professor has given you an assignment on the population of the US during the late 1800s. You are to use the following map, located on Digital DU, for reference: "Density of Population, Compiled from 9th census" by Arthur de Witzleben, 1872. Please find the map.

Remember to verbalize your thoughts and tell me when you have completed the task.

(Follow-up questions for clarification.)

Ex: When you scrolled through the search results, what were you looking for?

Scenario 2

Your professor has given you an assignment on Jewish history in Colorado. The assignment requires images of local Jewish individuals in the early-mid 1900s. Your professor has asked you to find an image on Digital DU. Please find one image of interest to you for this assignment.

Remember to verbalize your thoughts and tell me when you have completed the task.

(Follow-up questions for clarification.)

Ex: When you clicked on _____, why did you (not) select that image?

Scenario 3

Your professor has assigned a class discussion on the impact of tuberculosis on Colorado's Jewish community. You have been asked to refer to an image from Digital DU which, in your opinion, visually demonstrates a part of this impact. Please find an image appropriate for this assignment.

Remember to verbalize your thoughts and tell me when you have completed the task.

(Follow-up questions for clarification.)

Ex: When you clicked on _____, why did you (not) select that image?

Do you have any additional comments?

Attachment C: Interview Script

Participant # _____

Interview Script

Question 1a (Selection)

What factors did you consider when deciding on an image?

Question 1b (Selection)

Were the considerations the same for each image?

If not: How did they differ and why?

Question 1c (Selection)

What was the most important factor in each case?

Question 2a (Metadata)

Which information did you find most useful while searching for images?

Question 2b (Metadata)

Is there any additional information which would have been useful to you in finding

these images?

Question 2c (Interface)

Are there any other features which would have made it easier to find images?

Question 3a (Preference)

Do you prefer to search or browse for images?

Why?

Question 3b (Preference)

Was this the same in each scenario?

(If no) Why not?

Question 3c (Preference)

How important is the thumbnail when selecting an image?

Why?

Question 4a (Keywords, if keyword searches were used)

When searching, what results did you expect?

Why?

Question 4b (Browsing Categories, if browsing strategies used)

When browsing, where did you expect to find images?

Why?

Question 4c (Results)

Were the results/categories what you expected?

Why (not)?

Question 5a (Digital DU)

How did you feel about using Digital DU?

(Ask for expansion, as needed.)

Question 5b (Digital DU)

What is your overall opinion of Digital DU?

(Ask for expansion, as needed.)

Do you have any additional comments?