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Comparative User Experiences of Next-Generation Catalogue Interfaces

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Abstract

One of the presumed advantages of next-generation library catalogue interfaces is that the user experience is improved—that it is both richer and more intuitive. Often the interfaces come with little or no user-facing documentation or imbedded "help" for patrons based on an assumption of ease of use and familiarity of the experience, having followed best practices in use on the Web. While there has been much gray literature (published on library Web sites, etc.) interrogating these implicit claims and contrasting the new interfaces to traditional Web-based catalogues, this article details a consistent and formal comparison of whether users can actually accomplish common library tasks, unassisted, using these interfaces. The author has undertaken a task-based usability test of vendor-provided next-generation catalogue interfaces and Web-scale discovery tools (Encore Synergy, Summon, WorldCat Local, Primo Central, EBSCO Discovery Service). Testing was done with undergraduates across all academic disciplines. The resulting qualitative data, noting any demonstrated trouble using the software as well as feedback or suggested improvements that the users may have about the software, will assist academic libraries in making or validating purchase and subscription decisions for these interfaces as well as help vendors make data-driven decisions about interface and experience enhancements.

Introduction

This study looks at vendor-provided discovery interfaces (Encore Synergy, EBSCO Discovery Service, Primo Central, Summon, and WorldCat Local) from a user experience standpoint to provide libraries with a means of comparing the relative advantages of the various products (and thus to

justify purchase and/or subscription decisions) and to provide vendors with a methodical source of data for improving their products.

The advent of the next-generation library catalogue and subsequently the Web-scale discovery platform has irrevocably changed the consideration of how library catalogue interfaces do and do not satisfy user expectations and user needs (Breeding, 2007; Majors & Mantz, 2011; Nagy, 2011; Vaughan, 2011). Leveraging observations and assumptions about the best practices of successful Web sites like Google, Amazon, and Flickr, and the user behaviors that are assumed to have developed from using those same sites, these interfaces offer a different user experience than that of traditional Web-based library catalogues.

The architecture of these discovery platforms is such that they are their own "layer" (including a relatively high degree of informational and potentially transactional interoperability between the discovery platform and an integrated library system) on top of a traditional Web catalogue; this allows a library to implement a discovery layer from one vendor while maintaining an integrated library system from another vendor, vastly increasing the competitiveness of the marketplace for these products as well as increasing the scrutiny with which libraries must evaluate potential discovery solutions. While there has been considerable comparative evaluation (e.g., feature comparison, informal user testing) by librarians of the interfaces, as well as partnerships between library-customers and vendors to assess the user experience of individual products, there has been little formal, rigorous comparative testing among the products with the intention of sharing the results widely for a common good. Even when results of comparative studies are made available (e.g., via library Web sites), the methodologies (and hence the implicit goals) of the comparisons are typically not.

LITERATURE REVIEW

Denton and Coysh (2011) give an excellent summary of the history of usability testing of discovery interfaces conducted up through the time of their own study.

For the purposes of study design, a wide range of formal and informal studies of discovery platforms (Arcolio & Davidson, 2010; Arcolio & Poe, 2008; Hanson, 2009; Keiller, 2010; MIT Libraries, 2008; North Carolina State University, 2008; O'Hara, Nicholls, & Keiller, 2010; Online Computer Library Center [OCLC], 2009b, 2010; Sadeh, 2008) were examined to see where there was consensus about patron activities that were expected to be supported and thus inform the selection and design of tasks. Studies of discovery platforms conducted subsequent to the initial literature review (Ballard & Blaine, 2011; Casserly, Cole, & Waller, 2011; Clancy & Watson, 2010; Denton & Coysh, 2011; Gross & Sheridan, 2011; North Carolina State University, 2011; Serials Solutions, 2011; Tufts University, 2011a,

2011b; University of Nevada, Las Vegas, 2011; Williams & Foster, 2011; Xavier University, 2011; York St John University, 2010; Youngen, 2010; Yunkin, 2011) reinforced the decisions involving study design. Studies of discovery platforms focusing on only searching within a single discipline (e.g., music, medicine) were not examined.

General works covering issues of discovery (Bates, 2003; Calhoun, 2006; Hanson et al., 2009, 2011; Majors & Mantz, 2011; Matthews, 2009; OCLC, 2009a) and the evolution of discovery platforms (Breeding, 2007; Nagy, 2011; Vaughan, 2011; Wang & Lim, 2009) also fed into design of user tasks, as did assessments of discovery platforms that either were not comparative user experience studies or did not disclose details of their comparison process (Cornell University Libraries, 2011; Dartmouth College Library, 2009; De, 2009; Featherstone & Wang, 2009; Fisher et al., 2011; Marmot Library Network, 2011; Philip, 2010; Rowe, 2010, 2011; Tofan, 2009; Yang & Wagner, 2010).

Scope of Study
For the purposes of this study, test participants were limited to undergraduate students, the largest population of potential novice users in a university setting.

Participants were all undergraduate students enrolled at the University of Colorado (see Appendix 1 for demographic data of participants). Current and former employees of the University of Colorado Libraries were not eligible to participate in this study in order to eliminate any possibility of participants having received on-the-job training on library systems, best practices for searching, and/or library jargon.

Open-source discovery interfaces were not included in the study in order to allow for a more focused comparison between the (vendor-provided, turnkey) products. It is typical for a library either to be looking only at implementing open-source solutions (because the library has access to software development resources) or only at vendor-provided solutions (because the library does not have such access, or does not wish to allocate those resources toward a discovery interface); this study focused on gathering and analyzing data for the latter group.

To limit data collection to current practical product offerings, the range of vendor-provided discovery interfaces was limited to products that would be expected to be proposed by a vendor to an academic library-issued RFP. Hence, the most recent product developed and marketed by a vendor was included (e.g., Encore Synergy rather than Encore; Summon rather than AquaBrowser).

Methodology
Because the objectives were to assess existing functional products, task-based assessment testing (rather than focus groups or card sorts) was cho-

sen (Rubin, 1994). After reviewing their rights with regard to participation (see Appendix 2), participants were given a script of four common library tasks (see Appendix 3) to complete and were instructed to begin each task in the discovery interface they were testing; participants were also told that it was fine to go beyond the discovery interface if necessary or desirable to complete tasks. Each participant was given the same set of tasks (with small editorial changes to reflect differences in library holdings) and in the same order.

In keeping with common practice for task-based testing, participants were asked to "think out loud" about what they were doing and why they were taking various steps. Usability testing software (Morae) recorded both their on-screen actions as well as their face and voice during task completion.

Each participant tested only one interface, as having a single participant test multiple interfaces could have caused "learning" from one interface and improving or otherwise modifying one's performance on subsequent interfaces.

As is typical in a competitive market space, there is a lack of consensus among the vendors on what exact array of patron tasks are or should be supported by a discovery interface, thus it was not easy or even necessarily desirable (from an assessment standpoint) to design tasks that could assuredly be completed in every interface. Tasks were instead based on some of the most common undergraduate user activities and therefore in some cases may have tested an interface's ability to guide the user toward other resources that would allow task completion (e.g., the library's Web site). Further, many features of the discovery interfaces were either not tested or not explicitly tested (e.g., social Web features like tagging).

Each discovery interface was tested by five or six participants in total, a number accepted as sufficient to identify the most significant areas for improvement with respect to usability and user experience (Rubin, 1994). An actual library implementation of each discovery interface was used for testing (see Appendix 4). For the purposes of task completion, participants were instructed to assume that they were undergraduates enrolled at the institution whose interface was being tested.

After completing the four tasks, or after forty minutes elapsed without task completion, a survey instrument (see Appendix 5) was used to capture basic demographic data as well as the participant's impressions of their relative success using the discovery interface and their recommendations for improvements.

ANALYTICAL PROCESS

Participants' oral comments (made during task completion) along with written responses (in answer to questions on the survey instrument) were transcribed and analyzed for trends and especially consensus of opinion

or behavior among participants. Actions taken by participants, especially where task completion was difficult or took an unusually long period of time (with respect to other participants testing the same and/or other interfaces) were also analyzed for possible areas of improvement.

Findings

Library Jargon and Practices
In some cases, library terminology was a significant obstacle for many study participants. Comments and actions of participants (e.g., using the "find on page" feature of the browser) suggests that the term "interlibrary loan" is known and understood, while other phrases like "government publication" and "electronic resource" are opaque. It is clear that in some areas the library could adopt different public-facing terms that might more clearly suggest to patrons what is meant.

Somewhat related to this, participants found the nicknames given to library catalogues to be nonintuitive. A link in a discovery interface offering to let the patron "search Chinook Classic" did not give enough clues to a novice patron about why they would or would not want to click on the link, nor what "Chinook Classic" was in contrast to the discovery interface. As most academic libraries experience significant turnover in patrons due to annual influxes of new students, it is worth examining the ongoing value of a brand identity for the catalogue versus a simpler label (like "library catalogue") that conveys what is the catalogue.

In completing task one, many participants wondered about what kinds of resources qualified as a "book" qua book: would a dissertation, a government publication, and/or an electronic book qualify? This may reflect an ambiguity that is grounded in reality (i.e., a faculty member who had given such an assignment may or may not accept a government publication as a book), but it may still be worth examining whether the library's culture of description can make it clearer when a government publication is "book-like" and when it is a primary source, etc.

In completing task three, many participants wondered why they were getting several different versions of the "same" resource in their search results, such as a compact disc and a long-playing record of the same album by The Beatles. Implementation of RDA may eventually help discovery platforms approach the display of these kinds of search results differently.

Participant Behavior
Participants treated a single search box as a "Google"-like search and would use the search interface to try many kinds of things that were not supported by the discovery interfaces. None of the discovery interfaces offer any transparency about what is being searched and/or indexed, and user behavior reflected a trial and error methodology of figuring out what user tasks were actually supported. For example, virtually all of the

participants typed the title of a book—that they knew the library did not own—into the search box to see what would happen. (Many participants typed the title in several times, even commenting that they expected the interface to connect them with a copy of the book regardless of whether the library owned the book.) Participants also variously typed phrases like "interlibrary loan," "help," and "chat with a librarian" into the search box in efforts to find these various services.

Some participants also spent considerable time looking around for features they hoped or presumed existed that would support their desired path toward task completion—for example, looking for ways to mark records for later review and/or send records by email to themselves or to others. This may support a view that participants are already familiar with some best practices about Web sites and Web applications and will expect some features to exist.

Participants generally scanned at least one page of search results in full before selecting resources to look at more closely. Very few participants moved beyond a first page of search results. If the first page of search results were not promising, the participant would typically iterate by trying a different search strategy (i.e., without using any available refinement options first).

Participants also were very comfortable and willing to navigate between search results and individual records. In cases where this involved moving between interfaces provided by different vendors (i.e., the traditional Web catalogue was from a different vendor than the discovery platform), or interfaces that had dramatically different looks and feels, no participants registered any confusion or discomfort with this need to move between interfaces.

Task Achievement

To remind themselves to look at search results again later (in task three), the most common way of accomplishing the task was to email some or all search results to oneself, either using an email function imbedded in the search interface (eight participants) or by opening a browser-based email client and pasting records into an email message (five participants). The next most common method was to use a patron account within the discovery platform to save records for later consultation (six participants), followed by writing a note to oneself (i.e., not using the discovery service software at all; two participants).

To get a book not owned by the library, most participants either used a consortium resource-sharing system (ten participants), requested the item via interlibrary loan using the library's Web site (eight participants), or sought online assistance from a library employee (four participants). Only one participant used the library's Web site to request that the library purchase the title in question.

Favorable Participant Responses
A substantial number of participants (twelve) noted in written comments that they were appreciative of the ability to find different kinds of resources and then use available tools to narrow their search results. This feedback strongly supports the general trend of discovery interfaces, whose implicitly encouraged search behaviors (using facets, etc., after initial search results are returned rather than articulating limits in advance of searching) and breadth of coverage (with electronic and digital resources included much more comprehensively) relate directly to these affirming statements.

Seven participants commented favorably on imbedded features to email search results and/or specific records or articles to oneself, with another two commenting favorably on the ability to find relevant results.

Constructive Participant Responses
Two of the three written questions on the survey instrument asked for constructive criticism, so the data of this study are necessarily skewed toward the constructive. Data presented here are based on consensus among a majority or substantial minority of study participants. Where there are fewer recommendations, there was less consensus about what issues to address (as differentiated from there being fewer issues).

EBSCO Discovery Service (EDS)
Differentiate EDS from EBSCO's Other Products. One of the first problems that participants had using this interface is that they already had a strong association with the EBSCO brand identity and associated it exclusively with article searching. This may have been reinforced by the similarity of the out-of-the-box interface design of EDS compared to EBSCO's article searching interface. Finally, searches whose results were focused on articles may have reinforced perceptions that only articles were being searched. Several participants' comments made it clear how deeply the EBSCO brand identity is entrenched:

> "Instead of using EBSCO, I'm going to go to the James Madison site so I can look at their own content [i.e., books]."

> "OK, actually I'm going to go to the JMU library because that's probably what I should have done in the first place, instead of looking . . . in EBSCO."

Connect to Resource Sharing/ILL. As with several of the interfaces tested, EBSCO Discovery Service does not cascade well to resource sharing if a resource is not found indexed in the service itself. As one participant expressed, "the last task was more difficult because I had to leave [EDS] and go to the library page."

Make It Clearer How to Use the Structured Search. The structured search boxes presented by default in the interface tested were dauntingly unclear to participants.

> "I'll go ahead and do political campaign in the first [search box] because I want those two things together."

> "The select a field tab isn't very clear as to, I don't know, there's just no, I can't find the source of only books. But I had it a second ago. I'm going to try TI title but I don't know what TI means."

> "I'll just type it in and see what I get. Maybe I can use this select a field thing."

> "The search input boxes were a little hard to understand."

> "I would like the source type and refine search menus by the search input boxes so I don't have to make an extra step to refine my search after I already typed it in and hit enter."

> "The drop down tab next to the search was unclear."

Address the Need to Login. Finally, the need to login just to perform searches was seen as an unacceptable hurdle to study participants.

Encore Synergy

Simplify, Streamline, and Optimize the Interface. Several participants commented negatively on the cluttered and "busy" look and feel of Encore Synergy.

> "Related searches; this would have been convenient to see earlier on in the search and I couldn't see it cause it's buried on the right side of the window."

> "It seems like this page is a little busy, there are too many icons and options."

> "I'm going to pull up an entirely new site, seems like." [on logging in]

> "The way I think does not match the search box."

> "[The change that would make the biggest improvement would be having] similar layouts for articles as for books and recordings, including the same buttons. The uniformity would help."

Add an Advanced Search Option. Several participants wanted to be able to precoordinate limits on one sort or another, understandably given that tasks asked them to find (for example) books or sound recordings.

> "[The change that would make the biggest improvement would be to] make a clear 'advanced search' option in the initial . . . home page."

Primo Central
   Make It Easier to Find and Use Existing Options. Several participants strug-
gled to find or use existing features that were a little hard to find or whose
use was initially opaque.

> "And then by looking at additional services under the specific item
> entry which is kind of hard to find I guess, for just knowing how to
> email it, I guess you could always open an email client but there's a
> nice export tool for email."

> "So I guess that would be the best way to actually query and then add-
> ing individual articles to the e-shelf. So it's kind of easy to find, I guess,
> just looking on the page but tagging items and putting them on the
> electronic shelf wasn't incredibly clear on how to do that."

> "[The change that would make the biggest improvement would be
> to] create a more expansive toolbar at the top of each page that has
> one-click links to the most common tasks."

   Connect to Resource Sharing/ILL. As with several of the interfaces tested,
Primo Central does not cascade well to resource sharing if a resource is
not found indexed in the service itself.

> "The fact that interlibrary loan was several pages away from the search
> option [was a challenge]."

> "I could not figure out how to perform the last task. The search did
> not show a book that I could get on [interlibrary] loan and I could not
> easily find what I needed."

Summon
   Make It Easier to Find and/or Use Email Option. There was consensus
among participants assessing Summon that the email option was hard to
find or lacked features they expect from an email function.

> "I finally found the button where it says email it."

> "I seem unable to find a way to directly email this to myself, or to my
> research partners in this case. Back at the initial search looking for any
> way to email this to myself, to who I'm supposed to. Don't think export
> was all I wanted it to be. Aha! OK, found this."

> "[I] had to use [gmail] instead of the built in search and save."

> "Emailing whole searches [is challenging]."

   Connect to Resource Sharing/ILL. As with several of the interfaces tested,
Summon does not cascade well to resource sharing if a resource is not
found indexed in the service itself.

> "[The change that would make the biggest improvement would be]
> having the ILL feature on the page description for a book."

> "[The change that would make the biggest improvement would be making it] easier to do outside of library searches."

Address Misconception of "Add Results Beyond Your Library Collection." Summon had a promisingly labeled function that did not do what participants expected. In point of fact, none of the participants was able to figure out what this function was actually doing.

> "Ok I'm really surprised that doing the add results beyond your library collection isn't bringing [the book] up."

> "I use the add results beyond your library button which I thought would give me something and all it does is give me more newspaper and journal articles."

Increase Reliability of Full-Text Links. Several participants were stumped about why there were entries for journal articles in search results with links to full-text that would then not resolve appropriately. This was painfully frustrating for participants.

> "Weird. I don't know why it let me click on it if they don't have it. Cause it's just like a weird situation. But it said full text. Ok."

> "Lots of broken links for looking up articles."

Make It Clear[er] When/Why Options Reset. When navigating between search results and individual records, several participants noted that their chosen refinements would reset, which they found annoying.

> "It reset my refinements and subject terms."

> "Seems to have wiped my search terms again."

> "The side bar on searches with the check boxes updates after only checking one box. I would prefer to make all of my selections then click use new search criteria."

WorldCat Local

Make It Easier (in Several Ways) to Use Email Option. Participants were unanimous in rejecting the ongoing need to "prove they were human" by typing in two words in order to use the email function. Some participants indicated they would be willing to do this once, but would then expect the system to "remember" that they were human for a period of time. (Alternatively, if there is a valid business reason for requiring this, stating so might help.) Additionally, the email function was hard to find for some participants and lacked features that were expected by participants.

> "These word boxes are ridiculous."

> "I've never seen a word-type thing on a library system before."

> "You can change the subject but not the email message. That seems pretty backwards."

> "Email is a little small; you gotta look for it."

> "[The change that would make the biggest improvement would be] making the email and sharing function quicker."

Connect to Resource Sharing/ILL. As with several of the interfaces tested, WorldCat Local does not cascade well to resource sharing if a resource is not found indexed in the service itself.

> "Not really seeing anywhere to request it. Or have the library get it to where it is; which libraries have it. Maybe you need to sign in and do it to request it."

> "Finding out how to request items or have the library hold an item or get an item from another library [was challenging]."

Make It Clear[er] When/Why Options Reset. When navigating between search results and individual records, several participants noted that their chosen refinements would reset, which they found annoying.

> "To go back you have to recheck music. Doesn't keep what you checked if you go back in the browser. It's nice it gives you all the editions and the years, but again, when you go back it resets to books."

Improve Layout (e.g., so It Is Clear[er] When an Abstract Is Not Available). The layout of an individual record in WCL is long enough that scrolling is typically required to see all of the information. It is thus not possible to see all information on one screen, and participants found themselves scrolling up and down quite a bit to try to assess all of the information available and determine whether they had enough information to evaluate the resource.

> "Is there a summary. There's no summary here, but it does not say that the summary is not available, so I'd be looking for the summary."

> "[The change that would make the biggest improvement would be] having the info describing articles in a vertical list instead of a paragraph. I do not mind scrolling through results, I just don't want to miss any info."

All Interfaces
Introduce Further Enrichment Options to Allow Patrons to Evaluate Resources. Virtually all participants looked for a richer metadata (in the largest sense of the word) experience than library catalogues, including discovery platforms, currently offer. A quick comparison to Amazon's online shopping experience shows the library industry lagging considerably behind. Depending on the book/resource, Amazon offers rich data of ratings, reviews, lists of similar items, the ability to search within the book, the ability

to see front and back cover, the ability to read the first chapter, etc. Where enrichment options like these exist in library catalogue interfaces, they are not nearly as rich in terms of the available data and they are much less well integrated into the user experience.

Make It Possible/Intuitive to Add All Results to a List and Export All Results. All of the platforms actually had these functions, yet participants struggled to find and make effective use of them. The metaphors and design choices surrounding these functions need to be rethought for all of the platforms.

Provide Context so That It Is Clear What Has Been Searched (and What Is Not Included). Most or all participants struggled with trying to figure out what was and was not included in the search experience and, as previously noted, there is no transparency in any of these interfaces about what is included/omitted. Since it is customary for (at least) some licensed content not to be included in a discovery platform, the user will need to know (or at least be able to determine) that not all library resources have been searched.

Partner with Libraries Better on Who Does What. Most participants struggled at some point during their tasks to find a service provided not by the discovery platform but provided elsewhere on the library's online presence. Online chat, interlibrary loan, purchase suggestions, consortial resource-sharing options, and other "help" resources were variously provided in a way that was relatively disconnected from one or more of the discovery platforms—and each platform failed to provide an easy roll-over (or "fail-over") to the library Web site for at least one of these services. As the library "catalogue" (even as our understanding of that word may be evolving) continues to dominate the user's understanding of how to find library services, a much tighter integration of library services between "catalogue" (i.e., discovery platform) and Web site would greatly improve user service and user satisfaction.

Make It Easy to Get Help. Strongly related to the previous finding, a much stronger integration of help features is needed. In particular, participants were not reluctant to use chat-based help to pose a question to the library if a chat feature was incorporated into the discovery platform in an obvious way.

POTENTIAL PROBLEMS IN STUDY DESIGN

Most usability studies test the efficacy of the interface or product in doing what it is intended (designed) to do. This user experience study tested instead the ability of patrons to accomplish actual tasks. Thus, in some cases the interfaces simply do not have features to support all tasks.

Library implementation and configuration choices surely played a role in some tasks. For example, the presence/absence of an "ask the librarian" or chat feature could make some tasks easier or harder, as could the

Table 1. Summary of Possible Improvements

EBSCO	Differentiate EDS from EBSCO's other products.
Discovery	Connect to resource sharing/ILL.
Service	Make it clearer how to use the structured search.
	Address the need to login.
Encore Synergy	Simplify, streamline, and optimize the interface.
	Add an advanced search option.
Primo Central	Make it easier to find and use existing options.
	Connect to resource sharing/ILL.
Summon	Make it easier to find and/or use email option.
	Connect to resource sharing/ILL.
	Address misconception of "add results beyond your library collection."
	Increase reliability of fulltext links.
	Make it clear[er] when/why options reset.
WorldCat Local	Make it easier (in several ways) to use email option.
	Connect to resource sharing/ILL.
	Make it clear[er] when/why options reset.
	Improve layout (e.g., so it's clear[er] when an abstract is not available).
All interfaces	Introduce further enrichment options to allow patrons to evaluate resources.
	Make it possible/intuitive to add all results to a list & export all results.
	Provide context so that it's clear what has been searched (& what is not included).
	Partner with libraries better on who does what.
	Make it easy to get help.

prominence with which the library featured interlibrary loan or resource sharing request forms. Other implementation choices were harder to discern without in-depth information from each vendor about configuration and customization options that might be available to the library, including the presence/absence of facets or other features. (See table 1.)

The test participants were usually beginning with a context for understanding and using discovery interfaces already in place. On the survey instrument, many of the participants self-identified as having used Encore Synergy some or quite a bit prior to participating in the test. Many of the participants had also probably used EBSCO's article searching interface, since the University of Colorado has a large portfolio of article databases provided by EBSCO, and thus were likely already familiar with the look and feel of EBSCO's discovery interface.

As the University of Colorado participates in an unmediated resource-sharing system that is integrated with Encore Synergy, many test participants also expected the ease of resource-sharing that they have come to expect with Prospector (an "INN-Reach" resource sharing system from Innovative Interfaces, Inc.).

Tasks were designed to be ambiguous about the definition of task completion in order to approximate reality (actual patron tasks) as closely as possible, but this made it difficult for some test participants to determine when and whether they had successfully completed a task. Some test par-

ticipants also demonstrated discomfort and/or stated that they were very uncomfortable with the ambiguity about whether they could proceed to the next task.

Tasks inevitably tested information literacy and/or the extent to which the test participants may have been exposed to bibliographic instruction, either at their own inclination or through their classes. For example, one participant did not know what "peer-reviewed" meant and further did not realize that he did not understand this phrase and chose inappropriate resources to satisfy the task involving peer-reviewed articles.

Since the participants did not actually have to write research papers on the topics provided, many participants were not reflective or evaluative about the resources they selected to complete the first two tasks. These tasks thus may have tested more the efficacy of the discovery interfaces for browsing and initial discovery rather than for final selection of resources. Additionally, an original intention to analyze the data quantitatively (i.e., comparing how long it took participants to complete tasks in different interfaces) had to be abandoned as the amount of time taken frequently seemed to reflect more on the participant's conscientiousness than on the interface's ease of use.

Recruitment methods for study participants included posters in several library facilities, announcements to the library Twitter and Facebook accounts, and word of mouth (from early study participants). These methods may have tended to skew results somewhat toward students who use the library more, although the data collected during the study does not suggest that this was a significant factor.

IMPROVING THE METHODOLOGY OF FUTURE STUDIES

Using multiple library implementations of each discovery interface should help to reduce the impact of library-specific configuration choices of the interface.

Recruiting test participants from multiple academic institutions should help to reduce the familiarity of test participants with any particular interface, whether familiarity of a discovery interface being tested or familiarity with other products from the same vendor (e.g., article databases from EBSCO).

Potentially including a task where the participant had an actual research topic that related to their coursework could increase their investment in finding appropriate library resources to complete their actual assignment.

Including more tasks, and more kinds of tasks, with some randomization of task selection that not every participant tries every task and would help ensure that the order of the tasks is random (to account for any "learning" that may occur by completing simpler tasks earlier in participation).

Appendix 1
Survey Instrument Data

The study used twenty-eight participants during the time period January 26–March 17, 2011.

Table 2. Participant Demographics

Freshman	5
Sophomore	9
Junior	0
Senior	14
Humanities	8
Social sciences	3
Sciences	11
Engineering	2
Music	2
Business	2

Likert-scale data

Table 3. The Tasks in This Study Were Easy to Understand

Strongly agree	61%
Agree	39%
Neither	0%
Disagree	0%
Strongly disagree	0%

Table 4. The Tasks in This Study Were Easy to Complete

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	20%	0%	0%	17%	83%
Agree	40%	83%	50%	50%	17%
Neither	40%	17%	20%	33%	0%
Disagree	0%	0%	30%	0%	0%
Strongly disagree	0%	0%	0%	0%	0%

Table 5. I Was Able To Find What I Need for These Tasks Using This Discovery Platform

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	20%	17%	0%	0%	17%
Agree	40%	33%	80%	67%	83%
Neither	40%	50%	20%	17%	0%
Disagree	0%	0%	0%	17%	0%
Strongly disagree	0%	0%	0%	0%	0%

Table 6. If I Were Doing My Own Research, I Would Be Able To Find What I Needed Using This Discovery Platform

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	40%	17%	0%	17%	33%
Agree	60%	83%	60%	67%	67%
Neither	0%	0%	20%	17%	0%
Disagree	0%	0%	20%	0%	0%
Strongly disagree	0%	0%	0%	0%	0%

Table 7. The Discovery Platform I Used Today Is Easy to Use

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	20%	17%	0%	17%	33%
Agree	60%	50%	40%	0%	50%
Neither	20%	33%	40%	17%	0%
Disagree	0%	0%	20%	50%	17%
Strongly disagree	0%	0%	0%	0%	0%

Table 8. Prior to This Test, I Had Used Library Catalogues Quite a Bit

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	20%	33%	20%	33%	17%
Agree	0%	17%	60%	67%	83%
Neither	60%	17%	0%	0%	0%
Disagree	10%	33%	20%	0%	0%
Strongly disagree	10%	0%	0%	0%	0%

Table 9. Prior to This Test, I Had Used the Libraries at CU Quite a Bit

	EBSCO Discovery Service	Encore Synergy	Primo Central	Summon	WorldCat Local
Strongly agree	20%	33%	20%	33%	17%
Agree	0%	17%	40%	67%	83%
Neither	80%	17%	0%	0%	0%
Disagree	0%	33%	20%	0%	0%
Strongly disagree	0%	0%	20%	0%	0%

APPENDIX 2
Consent Form

University of Colorado at Boulder

Libraries Information Technology Department

Understanding your participation in this study

We are asking you to participate in this study of library catalogue discovery platforms (also called next-generation library catalogues) and their ease of use. By participating in this study, you will help us suggest improvements for the product's design, making it easier to use.

In this study, we will ask you to perform a series of tasks using one of several discovery platforms, chosen at random. Afterward, we will ask about your impressions of the discovery platform you used. The session will take approximately 60 minutes. We will use the information you give us, along with information from other people, to make recommendations for improving the various discovery platforms.

We will be recording your activity completing the tasks (video) and the comments you make (audio). The recording will be seen by faculty and staff at the University of Colorado that analyze and compile the data. Additionally, excerpts of recordings may be used to compose a "highlights reel" to illustrate the results of the research at conferences, and data about the findings of the study may be used in library publications (typically journal articles or book chapters).

Your name will not be identified nor associated with the data in any way. However, given that video footage may be shown at conferences, completely anonymity cannot be guaranteed.

There are no foreseeable risks associated with this study.

If you need a break at any time, just let us know.

You have the right to withdraw your consent or stop participating at any time. You have the right to refuse to answer any question(s) or refuse to participate in any task for any reason. Refusing to participate in this study will not result in any penalty or loss of benefits to which you are otherwise entitled.

This project is being done under the direction of Assistant Professor Rice Majors of the University of Colorado Libraries. If you have questions, you may ask them now or at any time during the study. If you have questions after today, you may call us at 303-492-3965 or email rice.majors@colorado.edu.

By signing this form, you are indicating that you agree to the terms stated here and that you give the researcher permission to use your voice, verbal statements, written survey responses, and videorecorded image for the purposes stated above.

APPENDIX 3
Task Assignments for This Study

Start each task at this URL:
[URL]

If you need to log in, use the provided login credentials [using the Public Patron login prompt].

If you need to send information by email to other people, use this email address: [email]

1. You have a group project on water quality in Colorado. Find three books that might be good for this project. Email information about these books to your group ([email]) so they can find the books.
2. You have a group project on political campaign financing. Find three articles that might be good for this project, at least two of which must be peer-reviewed. Email your group ([email]) so they can find/read the articles.
3. Find all recordings that the library owns by The Beatles. Somehow remind yourself to look at these again later.
4. The library does not own the book "Pride and Prejudice and Zombies." Have the library get this book for you.

Note on task 1: The state in which the library was situated was used for the first task, e.g., Arizona for Arizona State University.

Note on task 4: In one case, the library did own "Prides and Prejudice and Zombies" and thus "Sense and Sensibility and Sea Monsters" was used instead.

APPENDIX 4
Discovery Platform Implementations Used For Assessment

EBSCO DISCOVERY SERVICE
James Madison University

ENCORE SYNERGY
University of Colorado Boulder

PRIMO CENTRAL
Vanderbilt University

SUMMON
Arizona State University

WORLDCAT LOCAL
Auraria Library (University of Colorado Denver/Metro State University/
City College of Denver)

APPENDIX 5
Survey Instrument

Participant Number   _____

Please circle one   Undergrad: First-year   Sophomore   Junior   Senior

School/College_____ Department _____

Have you ever been employed by the libraries on campus? Yes/No

Table 10. Likert Items for Survey Instrument

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The tasks in this study were easy to understand					
The tasks in this study were easy to complete					
I was able to find what I need for these tasks using this discovery platform					
If I were doing my own research, I would be able to find what I needed using this discovery platform					
The discovery platform I used today is easy to use					
Prior to this test, I had used library catalogues quite a bit					

What is easy to use about this discovery platform?

What is hard to use about this discovery platform?

What one change would make the biggest improvement to this discovery platform?

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