Evidence Based Library and Information Practice

Research Article

Using UX Testing to Optimize Discoverability of Non-traditional Resources

Lucy Campbell
Electronic & Continuing Resources Librarian
San Diego State University Library
San Diego, California, United States of America
Email: lgcampbell@sdsu.edu

Keven Jeffery
Digital Technologies Librarian
San Diego State University Library
San Diego, California, United States of America
Email: kjeffery@sdsu.edu

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Abstract

Objective – The accessibility of non-traditional resources presents ongoing challenges for users and librarians. This study investigates methods for optimizing metadata and the placement of search results to enhance the discoverability of these resources within library systems. Researchers conducted A/B testing to compare two features of Ex Libris Primo: the Resource Recommender and Discovery Import Profiles. The objective was to enhance user access to a broader range of informational assets beyond conventional collections. This study posed the research question: Is inclusion in the results list (Discovery Import Profiles) or are visually appealing advertisement-style cards above results (Resource Recommender) a more effective method for discovery of non-traditional library resources?

Methods – Researchers identified four key resource types for testing: librarians, frequently asked

questions (FAQs), databases, and research guides. An A/B test was conducted with each resource presented in the Discovery Import Profiles and Resource Recommender formats. Following the A/B test, a combined C test was conducted to validate findings.

Results – The ad-style cards achieved higher engagement rates, particularly for databases and FAQs, while research guides performed better when embedded directly in search results. This study highlights the strengths and limitations of each method. Databases and FAQs benefited from the visual prominence of the ad-style cards, while research guides were more discoverable within search results. However, minimal engagement with librarians as a resource type across both methods suggests the need for improved tagging and metadata strategies.

Conclusion – Findings underscore the importance of institution-specific research and localized assessments to ensure effective implementation of discovery strategies. This study provides a useful method for libraries aiming to enhance the discoverability of their non-traditional resources, ultimately improving user access and satisfaction.

Introduction

The accessibility of non-traditional resources, including databases, people, research guides, and frequently asked questions (FAQs), poses persistent challenges for both users and librarians. This research article explores methods for optimizing metadata and the placement of results to improve the discovery of non-cataloged resources. Researchers conducted A/B testing to compare two specific features of Ex Libris Primo available for the visual integration of non-traditional resources: the Resource Recommender (Ex Libris, 2024b), where resources are displayed as advertisement cards above the search results (Figure 1), and Discovery Import Profiles (Griffith, 2021), where resources are included within the search results (Figure 2). The objective was to enhance the discoverability of library services within the confines of the library discovery system, thereby improving user access to resources and services beyond collected material.

After a library website redesign, default results from the Ex Libris Primo Discovery System replaced bento-style results, which had exhibited a variety of information from separate and sometimes unrelated library sources (Holvoet et al., 2020). The Ex Libris system primarily highlights books, articles, and other library materials. While the bento approach brought siloed resources that are not normally available in the discovery system to the forefront, the transition to Primo search results diminished the ability to emphasize resources not indexed in the Alma/Primo system. This shift prompted an inquiry into the optimal presentation of non-traditional resources on different areas of the Primo results display. Consequently, in early spring 2024, four key resource types were identified as focal points for improved discovery: library employees, FAQs, databases, and research guides.

Two primary methods for incorporating non-traditional resources into Primo were identified: Resource Recommender and Discovery Import Profiles. Resource Recommender enables the promotion of non-traditional resources as advertisement-style cards positioned above search results, while Discovery Import Profiles integrates these resources directly within search results. It was essential to consider which of these options would be most effective in making resources discoverable for patrons.

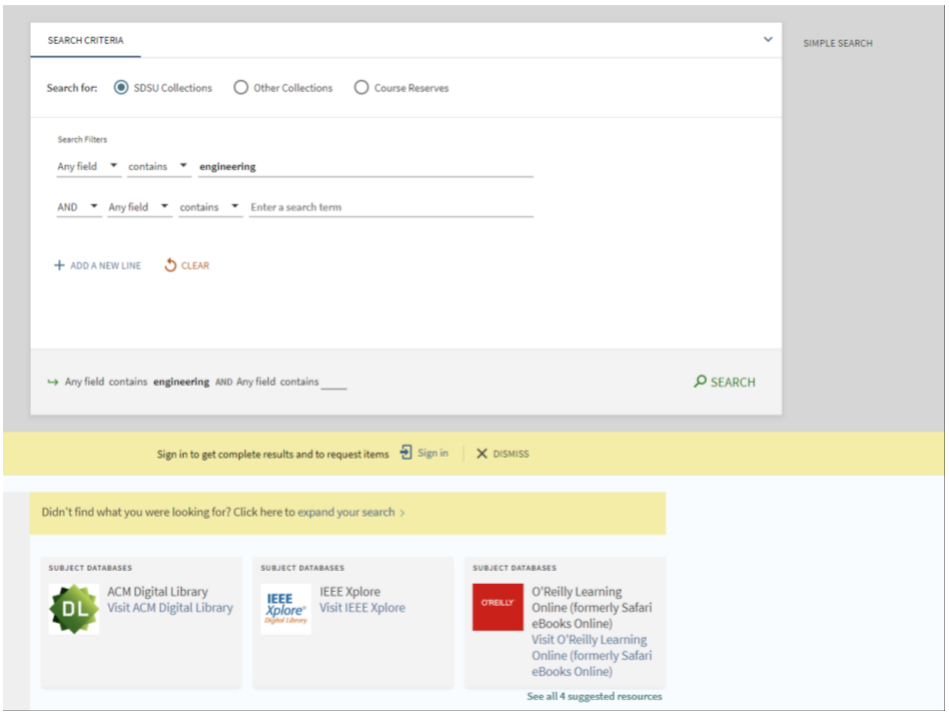

Figure 1
Resource Recommender cards displaying databases related to engineering.

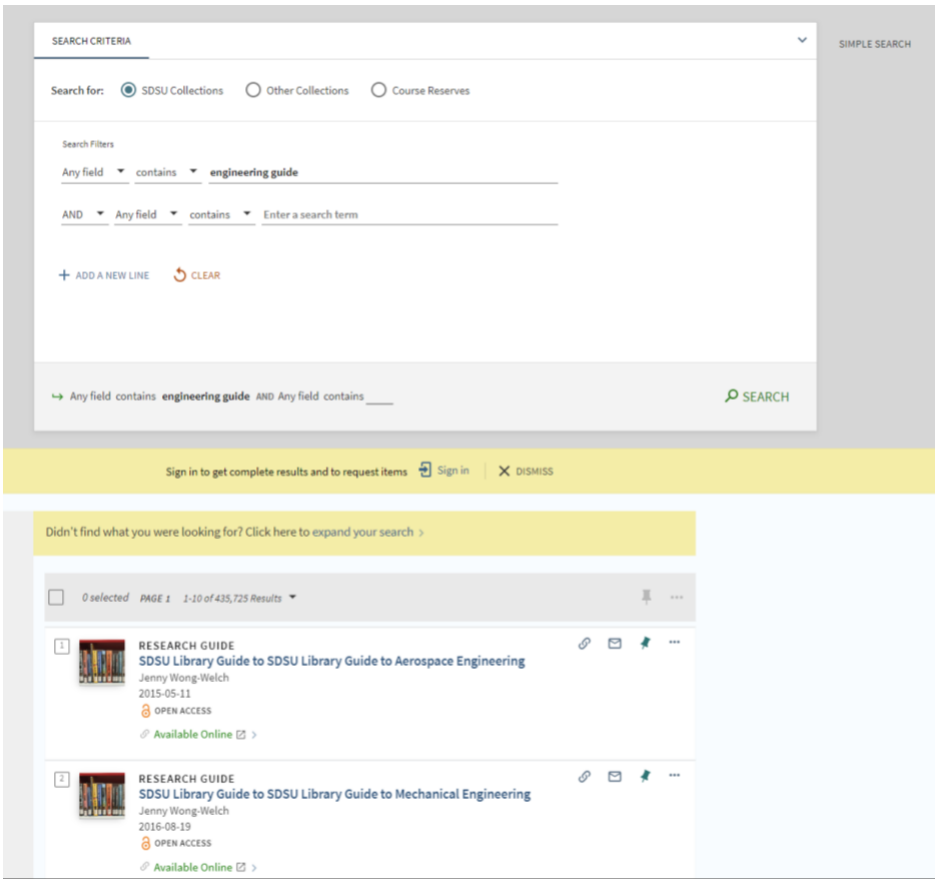

Figure 2
Search results list displaying research guides related to engineering.

Literature Review

Since the introduction of online public access catalogs (OPACs), librarians have investigated how to build more effective information discovery tools. Library discovery systems serve as gateways to vast information repositories, aiding users in accessing relevant resources efficiently. Understanding how users discover information within these systems is crucial for enhancing user experience and optimizing system functionality. Interfaces might feature elements such as boxes, results lists, facets, and filters to aid users in finding relevant information. Despite decades of research into user behavior, the question of which of these characteristics might prove most engaging for non-traditional library resources has yet to be answered.

One of the main challenges for discovery is user attention. Saracevic (2007) concluded users quickly scan results to identify potentially relevant items and will assign relevance almost immediately. Gaze behavior research suggests that users may bypass information perceived as irrelevant and proceed directly to

results lists (Kules and Capra, 2012). These findings suggest the ad-style cards are likely to be skipped over in favor of the results list, where users expect to find desired information.

A systematic review of library discovery layers noted that interfaces are designed to provide a user-friendly, single-search box experience, which tends to guide users straight to the results page where they can see and evaluate their search outcomes immediately (Bossaller & Sandy, 2020). However, Broder (2002) and Pirolli (2007) both concluded that user attention is drawn to prominent elements, for example thumbnails, dynamic elements, action buttons, or card-style layouts such as ad-style cards. This suggests that information visualization techniques and aesthetic design approaches may have more sway over user preference than expected.

Search result presentation influences users' perceptions of relevance. For instance, visually prominent results are perceived as more relevant, even when relevance ranking algorithms do not prioritize them (Kelly & Teevan, 2003). Khazaei and Hoeber (2017) looked at information visualization techniques that might help searchers find what they are looking for in library catalogs. They proposed replacing lists with word bars or word clouds to visually represent the most common terms found in search results, reasoning, "Prior studies have shown that searchers may not be able to make effective decisions when they are provided with a simple list of terms" (p. 62). Bar-Ilan et al. (2012) concluded in their research on tagged image searching that users reported greater satisfaction with a text-based search (i.e., a simple search box), which demonstrates that user experience and search success may not always correspond.

One compelling solution might be to include resources in both the results list and the visually appealing card layout offered by the Resource Recommender. However, the literature suggests there is notable concern for visual clutter, as users demonstrate a preference for minimal layouts with ample white space. Niu et al. (2019) found some users reported issues of choice overload and visual clutter when navigating search interfaces. Striking a balance between visual appeal and cognitive load is essential for optimizing user experience, and there is a strong argument against presenting the same information twice on one display.

Researchers must also consider the unique elements of their user group as it relates to library collections. A large-scale study of user search logs concluded that there is a vast array of different users who apply a wide variety of search tools and have varied understandings of advanced search (Zavalina & Vassilieva, 2014). This underlines the importance of conducting user research for the specific discovery interface and structured metadata employed by any library. Research must be institution-specific to be applied.

While there continues to be much debate over what makes a "useful" discovery interface, current literature does not seem to consider this question as it relates to non-traditional library resources. The unique nature of these information types makes them particularly intriguing and arguably more suitable subjects for investigation. Given their relatively lesser familiarity among users, they present a novel and promising avenue for scholarly inquiry.

Historically, libraries have relied on websites to provide access to resources such as research guides, contacts, and FAQs (Tella, 2020). A study of 1,496 library websites in the United States found that 72.5% included contacts for key staff individuals. However, while homepage design and navigation were noticeably consistent, contact information was the most varied element in terms of location, suggesting a lack of standardization and confusion over where and how people should be discovered. Only 50% of websites included FAQs, and inclusion of research guides was found to be even more inconsistent (Chow et al., 2014). It is not common practice to create metadata for these resources that allows them to be

discoverable through library search, although doing so provides multimodal access points that diversify discovery channels for these important resources.

By contrast, databases are cataloged with established metadata standards. It is common for databases to be listed in an A-Z list and made discoverable through search. The challenge for large academic institutions is maintaining these records as database access and trials are in constant flux. Oftentimes this results in haphazard, incomplete records or links to expired trials. Discovery of databases via search is also complicated by a tendency for patrons to misspell database names. Search logs reveal a range of common misspellings that are often not reflected in MARC records. By intentionally curating database content to only include core resources in each discipline and creating more flexible records, this workload can be made manageable and discovery more meaningful. The challenges around our own practices cataloging databases led the researchers to include databases in this study of non-traditional resources.

Aims

This study is guided by the research question: which is more effective for discovering non-traditional library resources, a results list (Discovery Import Profiles) or a visually appealing design element (Resource Recommender)? It attempts to answer this question by investigating four types of information resources: research guides, FAQs, databases, and librarian profiles.

Notably, the Resource Recommender displays a maximum of three resources above search results, with additional results nested under a "See all suggested resources" link. This constraint required that one of the four resource types be displayed within the search results to ensure it would not be overlooked. One of the guiding questions of this research then became, which resource type might be most effectively displayed within the search results?

By presenting these four information sources in two very different formats, researchers were able to draw some evidence based conclusions that might be applied to optimize user experience and information discovery in library search interfaces. Specifically, the findings aim to shed light on the impact of presentation formats on engagement, perception, and effectiveness in accessing non-traditional library resources. Such insights can inform the design and enhancement of library search systems to better meet the diverse needs and preferences of users. It also provides a useful case study and a method that might be applied across various types and scales of libraries, enabling the customization of search results to meet the specific needs of distinct user groups.

Methods

This project selected library resources not typically indexed in a library discovery system and presented them in an A/B test of Resource Recommender ad cards and search results display through Discovery Import Profiles and tracked patron engagement with both using an analysis of logged patron interactions (Figure 3).

While A/B testing commonly involves randomly presenting two alternatives to patrons, this study conducted these tests over a specified period and monitored patron engagement throughout. Additionally, a C test with both options displayed together was undertaken following the A and B tests. The experiment initially presented all four resources as ad-style cards for the A test, then removed them and placed the same resources within search results using Discovery Import Profiles for the B test. Finally, the resources were displayed together with both formats in the C test to validate findings and

gather supplementary data. Patron engagement with each test was subsequently analyzed to suggest the optimal placement for discoverability of each resource type.

Prior to integrating content into the discovery tool, resources to be included needed to be identified and metadata generated. The study did not want to overwhelm searchers with irrelevant or niche information and needed to identify keywords and tags to surface the targeted resources from among the expected library search results. For example, the library included over 600 subscribed databases in its SpringShare LibGuides database A-Z list, which necessitated a focus on surfacing the most impactful ones. A survey of subject liaison librarians was conducted to identify the most impactful databases for their respective disciplines, resulting in a curated list of 60 resources, such as Kanopy and Business Source Premier. These databases were designated as subject-related "Best Bets" in the library's A-Z database list to facilitate easy identification and selection when exporting these resources from the SpringShare system.

Researchers also analyzed search logs to determine which databases were most frequently sought. This analysis revealed a surprising variety of misspellings for database names. For example, a total of 11 misspellings of JSTOR were identified in search logs. To address this, common misspellings were added to database profiles in the A-Z list, so misspellings could be included as keywords attached to the database records during testing.

The library hosted a total of 184 FAQs on its website, including some extremely niche and non-library-specific topics. To identify the most suitable FAQs for inclusion in the project, a filtering process selected those with over 1,000 views. Subsequently, researchers interviewed the staff person responsible for the library's in-person and chat reference services to ascertain which FAQs were most frequently used at the reference desk, through live chat, and for email support. This two-pronged approach resulted in the identification of 17 FAQs deemed most appropriate for inclusion.

The library published a total of 178 research guides categorized by subject, course, and type. After careful review, it was determined that all public research guides should be included in the project due to their inherent discipline-specific value. Unlike the other types of information, research guides had long been incorporated into search results through Discovery Import Profiles and had been treated as open access publications. These existing search results were hidden from view during the A test of the Resource Recommender ad-style cards.

The library website featured a directory of 86 personnel, including staff, faculty librarians, and administrators. Faculty librarians maintain individual profile pages that enable researchers to schedule one-on-one meetings, access contact information, and review subject specializations. Each of these librarian profile pages were added as individual entries during the A, B, and C tests. A single entry for the library directory was created with each staff member's name added as a keyword to ensure that the directory would result from a search of an individual's name. A single entry for the library dean was also included for a total of 33 entries for library personnel in search results: 31 individual librarians, the library dean, and one result for the staff directory.

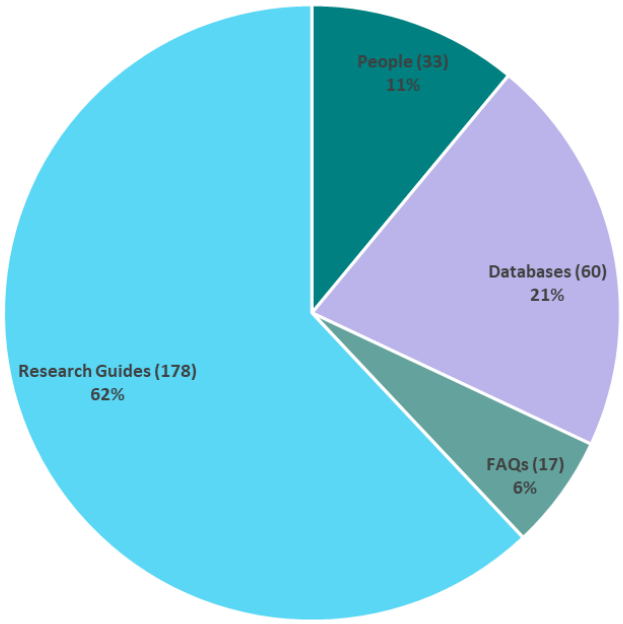

Figure 3
Selected resources for A/B and C tests.

Once resource selection concluded, the 288 items identified for inclusion needed to be made discoverable through the Resource Recommender and Discovery Import Profile search functions. The Resource Recommender provides out-of-the-box support for displaying ad-style cards, along with three customizable templates. Resources can be batch-uploaded to the Resource Recommender as an Excel spreadsheet with prescribed fields through the Ex Libris Primo management area. Out-of-the-box templates were utilized for databases while the other three resource types used custom templates. The librarian template provided in the Resource Recommender only allowed for an email link, so researchers opted to build a custom template that would link to librarian profile pages. Along with providing more contact options, including online booking, linking to the directory page also meant searcher interactions with the librarians from search results could be more easily tracked using custom URLs.

SpringShare APIs were utilized to gather data, which was then used to generate Excel templates for the Resource Recommender and XML files for the Discovery Import Profiles. The Discovery Import Profiles employed generic XML records that were normalized into Dublin Core and subsequently presented as Primo item records. To optimize search results, boosting mechanisms were applied to the resource types identified for inclusion (Ex Libris, 2024a). Additionally, boosting was applied to the title and subject fields to enhance visibility of the targeted resources and attempt to bring them to the front of search results.

Tracking of thumbnail “views” and link “visits” for these resource types was managed through an intermediary PHP script with data logged into a local database. A thumbnail display in the Resource Recommender ad-style card or a Discovery Import Profile search result was considered to indicate a resource had been "viewed," while a click on a resource link was considered to indicate a resource had been "visited." This information was gathered through analysis of log files.

An A/B test was conducted on the two types of visual discovery, with test A presenting the targeted resource types through the Resource Recommender ad-style cards and test B presenting the targeted resource types within search results using Discovery Import Profiles. Both tests were run until the aggregate number of thumbnail views of all resource types combined reached 900. Nine hundred was selected as the target view count because it was feasible within the project timeframe while also providing a sound benchmark for comparison.

The initial objective was to reach 1,000 views for each test. However, given that test B had at that point spanned more than 45 days, the decision was made to conclude the testing phase at 900 views, considering it an adequately large sample, and to revise test A data to reflect only its first 900 views. The time each test took to reach 900 thumbnail views was tracked; however, the authors acknowledge that factors outside of their control, such as the time in the semester and the variable demands of the curriculum in regards to library resources, made this information of questionable utility.

Following the completion of the A/B test, a C test was launched to make all the targeted resource types discoverable through both methods simultaneously. This comparison between the ad-style cards and the embedded search results aimed to validate the performance observed in the A/B test. The C test was structured as a "race to 900" with the two discovery methods pitted against each other in a race to reach a total of 900 views across the four item types.

Results

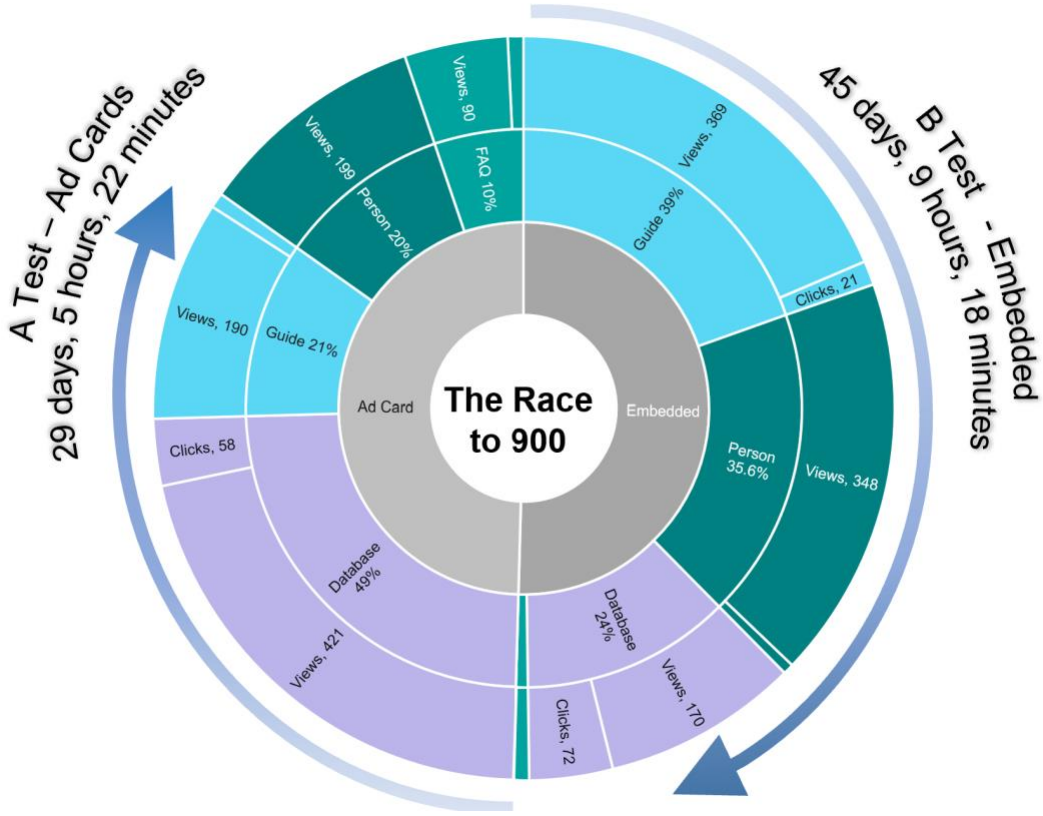

Figure 4
The A/B test race to 900.

During A/B testing (Figure 4), the ad-style cards showed superior performance in terms of views and click-through rates compared to resources displayed with search results. Within a span of 29 days, the ad cards accumulated 900 views, whereas resources imported into the search results achieved roughly half that engagement over the same time period. When displayed within the search results, the targeted resources took 45 days to reach 900 views. This difference suggested a higher likelihood of users engaging with non-traditional resources through the ad-style card visual layout of the Resource Recommender. However, as will be discussed, outcomes varied depending on resource type.

In test A (ad-style cards), databases garnered the highest engagement, accounting for nearly 50% of total views and visited resources. Librarian profiles and research guides each received approximately 20% of engagement, with FAQs accounting for the remaining 10%. In contrast, test B (embedded search results) showed minimal engagement with FAQs and more evenly distributed engagement across research guides (39%), librarians (36%), and databases (24%). These findings indicated that FAQs and databases are more prominently featured in the Resource Recommender's ad-style cards, while research guides are twice as likely to attract engagement when included in the search results list, as research guides and librarians had a more pronounced presence in the Discovery Import Profiles. However, overall engagement with librarians and guides was minimal in both tests.

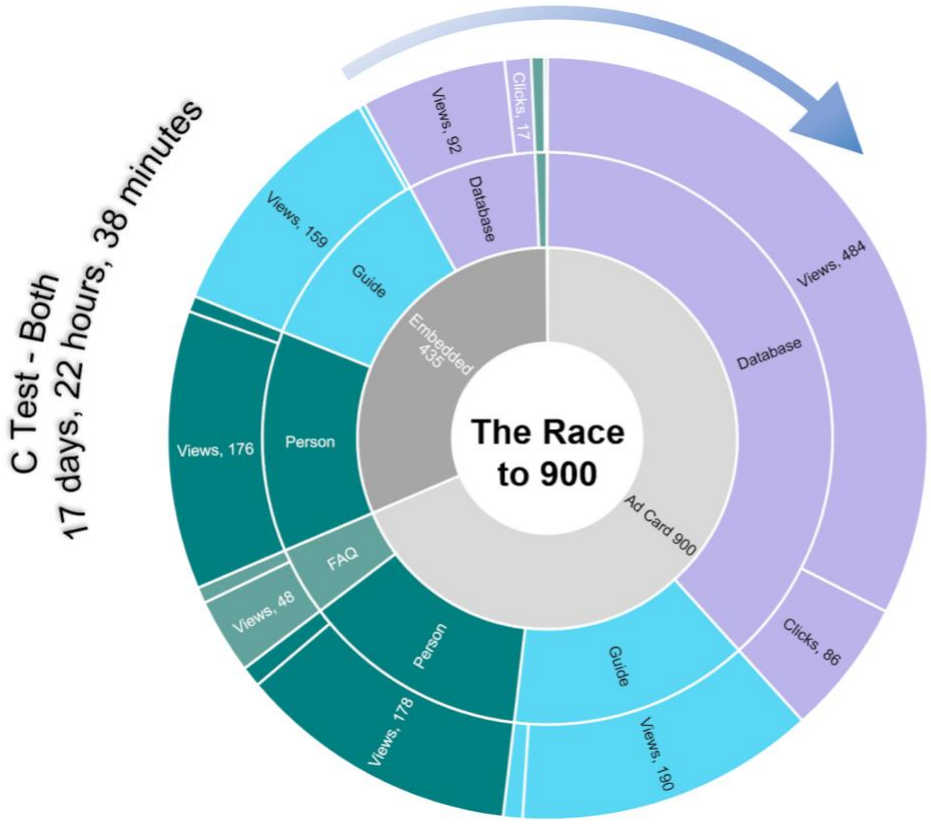

Figure 5
The C test race to 900.

Test C (Figure 5) featured both the ad-style cards and the embedded search results simultaneously. The ad-style cards again outperformed the resources embedded in the search results, reaching 900 views in

just under 18 days. In the same timeframe, the embedded results saw about half the number of views (435). Results by item type were strikingly similar to the A/B test. FAQs and databases again performed significantly better in the ad-style cards, and there was a marginally higher click rate for research guides and librarians. These findings indicated that the ad-style cards were a more effective tool for enhancing visibility and engagement with resources when compared to imported search results.

Discussion

Databases generated higher user engagement through the ad-style cards. An earlier log analysis indicated users often searched for specific database titles, indicating a preference for known items. The authors believe individual thumbnail images served as effective visual cues, especially when users were directed by instructors to locate and explore specific databases. It also seems that including misspellings and alternative names as searchable tags enhanced patrons' engagement with databases. Based on these findings, the researchers decided that making databases discoverable through the ad-style cards more effectively engaged users than including databases within the search results (Figure 6).

FAQs appeared more frequently and garnered greater engagement using the ad-style cards in both the A/B and C tests. FAQs seemed to get lost when included in search results using the Discovery Import Profiles, but using the ad-style cards, FAQs faced less competition from other resources, such as books and journal articles. When included directly in the search results, FAQs tended to be relegated to lower positions in the results or pushed to the second or even third page, likely due to their title words also appearing often in the titles of books and journal articles. They were not easily discoverable, even with a preferential results boost for the FAQ resource type and another to title words. Based on these findings, the researchers decided to make FAQs discoverable through the ad-style cards (Figure 6).

Although research guides performed well in the A, B, and C tests, the tests where they were embedded in the search results surpassed the tests of ad-style cards in both clicks and views. Researchers observed that research guides frequently appeared as the top result in search listings, likely due to the inclusion of the desired search keywords appearing in the title field, such as “Research Guide for Computer Science,” meticulous metadata cataloging efforts by librarians, and effective boosting strategies. Both subject and title boosting were implemented to ensure prominent visibility in search results. Research guides had already been integrated directly into the search results prior to this project, and there was no compelling evidence from this study to suggest increased engagement through the ad-style cards. Based on these findings, researchers recommended maintaining research guides' discoverability through search results via the integrated Discovery Import Profiles (Figure 6).

There was minimal engagement with librarians across all tests, suggesting a lack of interest in connecting with them through the library discovery system. However, there was slightly higher engagement observed with the ad-style cards. Although outside the scope of the original research, additional testing was done to increase engagement with librarian ad-style cards. Following the C test, additional keyword tags were implemented by asking individual librarians to enhance the tags and subjects attached to the LibGuides they maintained. Adding keywords to research guides and assigning these keywords as tags to the librarians’ Resource Recommender profiles resulted in the ad-style cards appearing for a greater number of search terms. The titles for the ad-style cards were also adjusted to emphasize the services offered, so each card was titled "Get Expert Help with Your Research" rather than focusing on individual names and positions. These straightforward adjustments to the Resource Recommender ad-style cards led to increased visibility of librarians in search results and higher engagement through clicks on the card

links. Based on these results, the researchers decided to continue offering ad-style cards for librarians and the library directory (Figure 6).

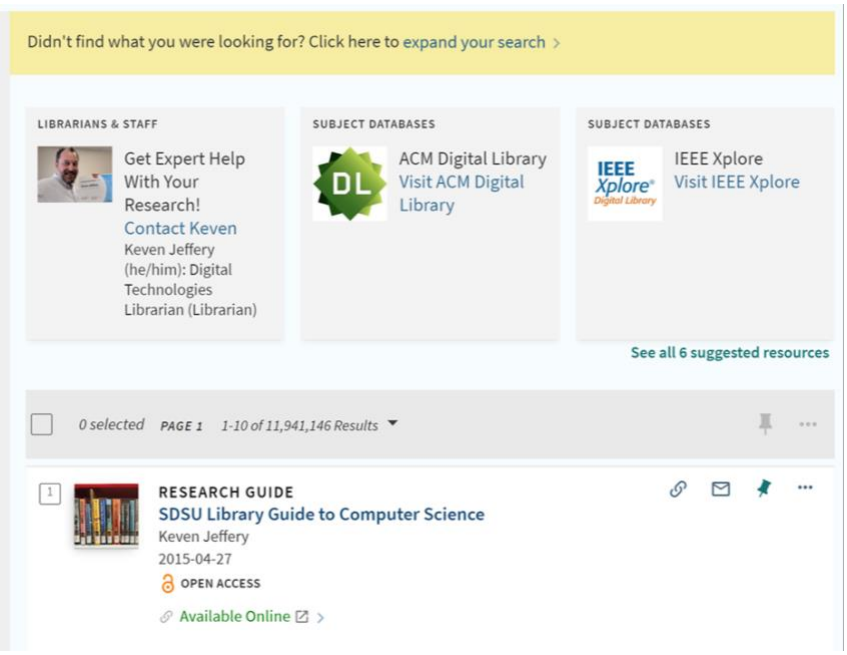

Figure 6
Final configuration showing librarians, databases, and FAQs in Resource Recommender and research guides displayed in search results list.

Overall, evidence indicates that ad-style cards show promise as a method for engaging searchers with resources that aren't traditionally cataloged in library discovery systems. However, in this examination, a limitation of the ad-style cards was the reliance of the Ex Libris Primo Resource Recommender feature on a narrow search scope and its connection of the ad-style cards to the appearance of specific keyword tags. To maximize its value, the Resource Recommender could be enhanced to trigger results whenever any related keyword appears in a complex or Boolean search. For example, it would be useful for the relevant Resource Recommender cards to appear for both a search for "computer science" and a search for "computer science AND artificial intelligence," which currently does not display computer science-related cards. This improvement would ensure that relevant resources are recommended regardless of the search query's complexity.

One clear benefit of resources appearing prominently in the ad-style cards is their visual prominence, similar to advertisements. However, there is a risk that users might overlook these featured resources and proceed directly to the standard search results. Also, resources embedded in the search results with the Discovery Import Profiles were often discoverable to users when institutional boosting strategies were implemented and when search terms were prominently featured in resource titles, such as with research guides. Nevertheless, it was clear that if subject terms or title terms were common across multiple resource types, including books and articles, targeted resources would often get lost or buried deep within the search result pages.

The results of our A/B and C tests reveal several key insights into enhancing user engagement with library resources. One notable finding is the significant increase in engagement achieved by adding more

tags and refining titles, for example by replacing individual librarian names with a call to action, such as "Get Expert Help." Another is increased discoverability when common misspellings and alternate names are added to the records. Additionally, the boosting of record types and fields like title and subject can be a powerful tool to enhance the discoverability of targeted resources.

To mitigate potential biases, the researchers focused on unobtrusive transaction logs to ensure a level of neutrality in the data collection process. This method minimized the influence of the researchers' presence on participants' behavior, providing a more objective measurement of user interaction. However, the study had several inherent limitations that should be considered when interpreting results. One significant limitation was the decision to compare A/B testing based solely on number of views and clicks. This approach did not account for the time taken to reach a specified number of views, which could be influenced by various external factors. For instance, the point in the academic semester could significantly affect counts, as student activity and engagement levels fluctuate throughout the term based on academic assignments, exams, and external events. The anonymous nature of the research meant there is no accounting for diversity of user sample technology. Variations in devices and browsers might influence how users interact with library search results.

The study could benefit from a more comprehensive approach. Combining transaction log data with usability studies, where users are asked to complete specific tasks, would provide a richer and more detailed snapshot of the user experience. This would allow for some differentiation between user intent—for example, those conducting in-depth research compared to casual searchers. Usability studies could uncover insights into user behaviors and preferences that transaction logs alone might miss, offering a fuller understanding of the effectiveness and user-friendliness of the tested features.

The researchers also recognize that the inherently unique characteristics of the institutional library could impact findings. Each library may choose to configure discovery in a way that suits their specific users' needs. The local implementation of any research findings must be carefully considered and supplemented with in-house studies to draw meaningful and actionable conclusions. Relying solely on studies conducted at other institutions can lead to misguided decision-making due to differences in contexts and environments. A study comparing results across institutions might lead to more generalizable conclusions. One suggested method to study local implementation is presented in this study, and librarians can certainly adopt it to their specific institution. However, it is crucial to independently verify results through localized assessments. This underscores the importance of having dedicated assessment librarians in academic libraries who can tailor evaluations to their institution's unique needs and circumstances. Ongoing assessment is vital for ensuring evidence based decisions are informed by accurate and contextually relevant data. Future studies might also research the discoverability of these not-traditionally cataloged resources individually.

Conclusion

In conclusion, these research findings underscore the significance of display options and enriched metadata in enhancing the discoverability of resources that are not traditionally cataloged within library discovery systems. The A/B and C tests, which compared ad-style cards and resources embedded within search results, revealed distinct advantages and considerations for each method. While the ad-style cards demonstrated superior visibility and engagement, embedded results offered a viable alternative for specific resource types. The study also highlighted the importance of resource selection, data enrichment, and system configuration in shaping effective discovery strategies. It is imperative to conduct institution-

specific evidence based research to design effective discovery interfaces that ensure user success and satisfaction.

Author Contributions

Lucy Campbell: Conceptualization (equal), Writing - original draft (equal), Formal analysis (equal), Writing - review & editing (equal) **Keven Jeffery:** Conceptualization (equal), Writing - original draft (equal), Formal analysis (equal), Writing - review & editing (equal)

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Appendix
Data Tables

Test A - Ad Cards	**Views**	**Clicks**	
Database	421	58	
FAQ	90	14	
Guide	190	13	
Person Thumb	199	0	
Total	**900**	**85**	
Elapsed Time	29 days, 5 hours, 22 minutes		
Test B - Embedded	**Views**	**Clicks**	
Database	170	72	
FAQ	13	1	
Guide	369	21	
Person	348	9	

Total	**900**	**103**	
Elapsed Time	45 days, 9 hours, 18 minutes		
Test C - Both	**Resource Type**	**Views**	**Clicks**
Embedded	Database	92	17
Embedded	FAQ	8	2
Embedded	Guide	159	4
Embedded	Person	176	10
Total		**435**	**33**
Ad Card	Database	484	86
Ad Card	FAQ	48	10
Ad Card	Guide	190	12
Ad Card	Person	178	13
Total		**900**	**121**
Elapsed Time	17 days, 22 hours, 38 minutes		