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What Does it Take to Make Discovery a Success?: A Survey of Discovery Tool Adoption, Instruction, and Evaluation Among Academic Libraries

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What Does it Take to Make Discovery a Success?: A Survey of Discovery Tool Adoption, Instruction, and Evaluation Among Academic Libraries

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Abstract

Discovery tools have been widely adopted by academic libraries, yet little information exists that connects common practices regarding discovery tool implementation, maintenance, assessment,

and staffing with conventions for research and instruction. The authors surveyed heads of reference and instruction departments in research and land-grant university libraries. The survey results revealed common practices with discovery tools among academic libraries. This study also draws connections between operational, instructional, and assessment practices and perceptions that participants have of the success of their discovery tool. Participants who indicated successful implementation of their discovery tool hailed from institutions that made significant commitments to the operations, maintenance, and acceptance of their discovery tool. Participants who indicated an unsuccessful implementation, or who were unsure about the success of their implementation, did not make lasting commitments to the technical maintenance, operations, and acceptance of their discovery tool.

Keywords: Discovery tools, academic libraries, assessment, attitudes, technical support, librarians, undergraduates, faculty, assessment, information literacy, library instruction, research

Introduction

Discovery tools have become a staple research instrument in academic libraries. The period of trials, beta testing, and debate over whether to adopt discovery tools is past. At the time of writing, most academic libraries across the United States, Canada, and the United Kingdom have made discovery a part of their library's research offerings (Hoffman and Yang 2012; Spezi, Creaser, O'Brien, and Conyers 2013). There continue to be vigorous and beneficial debates about the performance and appropriate roles of discovery tools, but there is little question that they occupy a significant presence in academic libraries' research services.

Despite the widespread adoption of discovery tools, little information exists that connects academic libraries' practices regarding discovery tool implementation, maintenance, assessment, and staffing with conventions for research and instruction. Much of the related scholarly work that has been disseminated narrowly focuses on one of these topics or describes local case studies. The research described in this article seeks to tie together academic libraries' practices regarding discovery tools and to find relationships between these practices and libraries' perceptions of success or failure with discovery. This research study seeks to answer the following questions:

1. How do academic libraries approach the implementation, maintenance, and technical support of their discovery tool?
2. What are the trends in discovery tool presentation in library instruction?
3. What are trends in the presentation of discovery tools on academic library web sites?
4. How do academic libraries measure the overall success of their discovery tools?
5. Which (if any) practices yield perceptions of success or failure with discovery tools?

These questions served as the framework for this research study and also guided the analysis of the results and the conclusions drawn from this study.

Literature Review

Much of the research on discovery tools examines performance, user behavior and attitudes, integration of discovery tools into instruction, and assessment practices. However, much of this research has been conducted on a small scale, with research subjects restricted to a single campus or institution. Research that has taken place across academic libraries has typically only explored

a single aspect of discovery tools. The authors found few studies that attempt to discover trends in the areas identified for this study across academic libraries and very few previous studies that attempt to discover current practices that might lead to discovery tool success.

User attitudes and behaviors towards discovery tools have been the focus of several studies, while some research focused on areas such as instruction has also produced useful information on user attitudes. Much of the research reviewed in this area involves librarian attitudes. Student attitudes towards discovery have been modestly researched, but studies on faculty attitudes are lacking.

A study by Timpson and Sampson (2011) revealed that undergraduate students have a growing expectation for one research starting point and that demand for instant gratification is growing in this demographic. In a study conducted at the University of Minnesota, Sadeh (2008) similarly observed that users' experience with familiar interfaces such as Google, Google Scholar, and Amazon create an expectation of what the search experience should be like.

Dalal, Kimura, and Hoffman (2015) observed that students tend to lack an overall understanding of how a discovery tool bridges the catalog, various databases, and scholarly publications. They believe that students need to be taught basic concepts, such as understanding why some databases only contain abstracts, realizing that full-text might not be immediately available, narrowing with facets and limiters, and emphasizing critical thinking. Conversely, a discovery tool usability study conducted at the University of Vermont (Nichols, Billey, Spitzform, Stokes,

and Tran 2014) found that undergraduate students quickly adapted to challenges, such as refining search results with filters and dealing with large results lists, throughout the usability test.

Much of the literature on the adoption of discovery tools has focused on reference and instruction librarians, particularly their views on discovery and critiques of the tools. Many librarians are enthusiastic about integrating discovery tools into their teaching and research. In a survey of librarians from institutions hosting discovery tools, Fawley and Krysak (2014) found that over 76 percent of librarians considered themselves "very likely or likely to use a discovery tool in library instruction" (289), giving reasons such as its value as a good starting point for research and its ability to search many different formats.

Negative criticisms of discovery tools among reference and instruction librarians have also been well documented. In Fawley and Krysak's 2014 study, librarians who were less likely to use their discovery tool in instruction cited problems such as technical glitches, the need for technical instruction, dissatisfaction with relevancy ranking, overwhelming results, and the reduced emphasis on search methods. Additional concerns include a lack of transparency about indexing and index coverage, a perceived over-simplification of search processes, the need to revise lesson plans and instructional materials, and suspicions that discovery tools create false expectations of immediate access to all indexed materials (Howard and Wiebrands 2011).

The literature also suggests that resistance to discovery tools among librarians may be due to bias. At the University of North Florida, Baldwin, Kucask, and Eng (2012) observed that some librarians and staff considered discovery tool results to be inferior to traditional database results,

even when discovery tool results were more accurate and more relevant. Furthermore, the discovery tool produced results from databases that the librarians would not normally have used. Aharony and Prebor (2015) conducted a psychological study to discover why some librarians are more apt to accept or reject discovery tools than others. The researchers found that personality characteristics drive the adoption and use of discovery tools by librarians. Those who anticipated failure or negative evaluation when engaging with new technology had more pessimistic attitudes and lower satisfaction with discovery tools, while librarians who were open to new experiences and embraced the challenges of new technology had higher levels of satisfaction.

The ways in which these librarian attitudes and behaviors have influenced actual levels of uptake and integration into library instruction are less clear. A small number of case studies present individual librarians' descriptions of their teaching practices. Buchanan (2013) describes how she adapts her teaching of discovery tools depending on the subject, the relevant format types, whether students are searching precisely or browsing, whether students need scholarly, professional, or creative sources, whether key disciplinary resources are indexed in the discovery tool, and whether students need technical instruction or critical engagement. She addresses different users' needs, noting that "[students in different disciplines] don't just use different resources, they often think differently" (9). Azadbakht (2015) underlines the merits of customization at different levels and for different subjects, and emphasizes that instruction librarians need the autonomy to adjust their teaching appropriately.

Other case studies describe experiences of program-level integration. For example, Seminole State College of Florida's implementation of Primo was generally well received among

instruction librarians, which Kaufmann et al. (2012) attribute to program-wide consensus about when and why students should use discovery tools.

There have been a similarly small number of studies seeking a broader view of instructional adoption across the profession through the aggregation of quantitative and qualitative data. Buck and Mellinger (2011) surveyed a small and self-selected set of Summon users, finding 72 percent of respondents used their discovery tool in instruction and 42 percent did so regardless of discipline or course level. Fifty-eight percent thought the discovery tool had shifted the emphasis of instruction from search techniques to understanding and evaluating results - and many saw this as a positive outcome.

Buck and Steffy's (2013) study was the first major study of discovery tool instruction across the profession, though responses were self-selected and self-reported. Results indicated that teaching the discovery tool was a matter of individual choice for most librarians, and that the nature of the instruction varied according to student level, course content, and assignments. It was most commonly taught to lower-division students (82 percent, compared with 65 percent teaching it to upper-division students) and for interdisciplinary research. Buck and Steffy (2013) also identified librarians' most common explanations of discovery tools to students: a place to launch your research (57 percent), a way to search across the library databases (51 percent), and one-stop shopping (50 percent).

As noted, several studies have indicated an overall willingness among instruction librarians to use and teach discovery tools, but Kulp et al.'s (2014) survey of Association of Research

Libraries (ARL) librarians has complicated this picture. This study - a purposeful response to the lack of large-scale surveys of academic librarians' use of discovery tools in instruction - reported "a 60/40 split between those who rarely or never teach the one-box versus those who often or always teach it" (307). Reasons for not teaching "one-box" searching included some of the persistent practical and philosophical criticisms of discovery tools, such as overwhelming results and inferiority to subject-specific databases. In addition, some reasons for teaching "one-box" searching were not entirely voluntary: requests from instructors, program-level requirements, and the discovery tool's positioning as the only point of access for catalog holdings.

Because of their relatively recent adoption within the field, assessment of discovery tools' longer-term impacts remain to be seen in library scholarship. However, significant documentation detailing the selection process of discovery tools exists to assist possible adopters. Moore and Green's (2012) literature review covers multiple libraries' selection processes, noting that different institutions utilized a variety of methods determined by the institutional culture. The literature also includes case studies detailing specific institutions' selection processes. Vaughan (2012) describes a number of methods utilized in UNLV's discovery tool selection such as staff surveys, consultations with early-adopter institutions, vendor visits, and content analysis. In a step-by-step guide developed from the literature and Rutgers University's selection and implementation process, Deodato (2015) lays out best practices for libraries, beginning with the formation of a selection team or committee. One such discovery tool committee at Auburn University opted to create actual reference questions, which they asked vendors to address with their specific systems during vendor presentations--a process

that led the committee to reach the unexpected decision that no discovery tool met the needs of their user community (Ellero 2013).

Other assessment initiatives found in the literature look to user interactions with discovery tools. Durante and Wang's (2012) framework of user-centered analytics tracks discovery tool adoption through indicators such as size of user base, user satisfaction, engagement, and the rate of task completion. Foster and MacDonald (2013) utilized multiple methodologies including think-aloud searching observation, a questionnaire, and an interview to compare discovery tools and their influence on user behavior. Other studies have compared and tracked user behavior and interactions with traditional library interfaces versus discovery tools. For example, Meredith (2013) examined the impact of discovery tool adoption on the type of reference questions submitted via e-mail, as well as the changes in reference services provided by the librarians; and Hessel and Fransen (2012) surveyed users of the traditional OPAC and the discovery tool to compare and benchmark user satisfaction and searching behaviors. Similarly, Asher, Duke and Wilson (2013) compared conventional library databases with Google Scholar and two discovery tool platforms: Serial Solutions' Summon and EBSCO Discovery Service (EDS). In this study, the researchers observed users' interactions with the tools and evaluated the resources that users located with them.

Assessment of discovery tools have led researchers and librarians to different conclusions, many of which are influenced by the institutional culture and specific user needs. In some cases, librarians decided that the discovery tool did not promote information literacy or the research process (Ellero 2013**).** Others found little to no evidence of change in the search strategies of

users, with Meredith (2013) pointing out that "giving them a single search box does not change their level of confusion about the search process" (9). Similar conclusions have led others to advocate for continued instruction for research training (Asher, Duke and, Wilson 2013; Foster and MacDonald 2013).

Although this body of research on discovery tool selection and performance, user behavior and attitudes, and integration into instruction is substantial and growing, very little research has examined the connections between these trends across academic librarianship. This study attempts to fill this gap by surveying academic libraries nationwide to discover current practices in discovery tool use, implementation, and support, and their connections to perceived failure or success.

Methods

This study utilized a quantitative survey to examine academic library implementation of discovery tools, the operational and instructional conditions of discovery tool use, and the methods used to evaluate their performance.

The survey instrument was developed by the researchers and peer-reviewed by an academic librarian and a statistician. It contained six categories of questions: demographic and institutional characteristics, operations and support, use in instruction, instructional materials, promotion and access, and assessment and evaluation. In most cases, questions contained a range of researcher-provided responses to which respondents could check all that applied. Several questions also

contained open-ended response boxes to allow respondents to explain or to expand on the selections in their own words.

Participants

The survey was disseminated to prospective participants in December 2015 and was closed at the end of March 2016. The researchers utilized non-probabilistic, purposive sampling of heads of reference and instruction departments at comparable or aspirational peer institutions to the researchers' home institution, which is a mid-sized public research university. The selection of reference and instruction department heads was designed to prevent multiple submissions from individual institutions. It was also based on the assumption that the librarians in reference and instruction positions would have the broadest knowledge of the six question categories.

The institutions selected for invitations to participate consisted of all U.S. land-grant universities, universities with the Carnegie Classification of "High Research" or "Very High Research," and other U.S. members of the ARL. Using these criteria, 194 institutions were identified as eligible for participation. The researchers determined who the heads of reference and instruction departments were for each institution and invited them by e-mail to participate or to forward the invitation to another person in their library who might be better able to respond to the survey questions. A total of 56 surveys were completed for a response rate of 28.8 percent. An additional 38 surveys were begun but not completed and were therefore excluded from the data analysis.

Data analysis

The resulting data were analyzed in several ways. Descriptive statistics and percentages were used to analyze the multiple choice survey questions. Working with the institution's Statistical Software Support and Consulting Services, the researchers also created cross-tabulation tables to study the relationships that arose between survey questions. However, most cross-tabulations generated numbers that were statistically insignificant and not reliable for the purpose of answering the study's research questions. Open-ended answers were qualitatively coded for thematic trends and were used to provide additional nuance to the answers selected in the multiple choice survey questions.

Results and Discussion

Demographics of Respondents:

The majority of respondents (93 percent) worked in academic library departments involved with reference and instruction services. Some of these respondents had positions that intersect with library systems, usability, and other areas such as project management, administration, selection, and discovery tool implementation. A small number of respondents (7 percent) reported no involvement with reference and instruction services, but their institutions' reference and instruction department heads considered them the most qualified to answer the survey and passed the survey on to them.

Responses from small (under 10,000 undergraduates), mid-sized (10,000-19,999 undergraduates) and large (over 20,000 undergraduates) institutions were evenly distributed. Small institutions

made up 32 percent of respondents, with mid-sized institutions at 32 percent, and large institutions at 36 percent. All respondents reported that their institutions offer graduate programs.

Respondents were asked which discovery tool their library employs and were allowed to select multiple options or write in a discovery tool that was not presented in the list of responses. The survey results showed that most respondents' libraries have adopted one of three discovery tool products. Summon was the most popular with respondents (45 percent, n= 25) followed by Primo (25 percent, n=14) and EDS (20 percent, n=11). Additional respondents reported using other discovery tools such as WorldCat Local (11 percent, n=6), Blacklight (3 percent, n=2), Mobius (n=1), WorldCat Discovery (n=1) and Encore Duet (n=1), but these were less commonly adopted.

Several data sets were cross-tabulated to examine potential relationships between institution size, discovery tool product, and staff resources used to maintain the discovery tool. The data indicate that small and mid-sized institutions tend to have adopted Summon and for those large institutions that responded to the survey, Primo has been implemented slightly more often than Summon. However, these results – particularly for the large institutions – should be viewed as only a trend as the difference between Primo, Summon, and EDS was quite small and not statistically significant (see Figure 1).

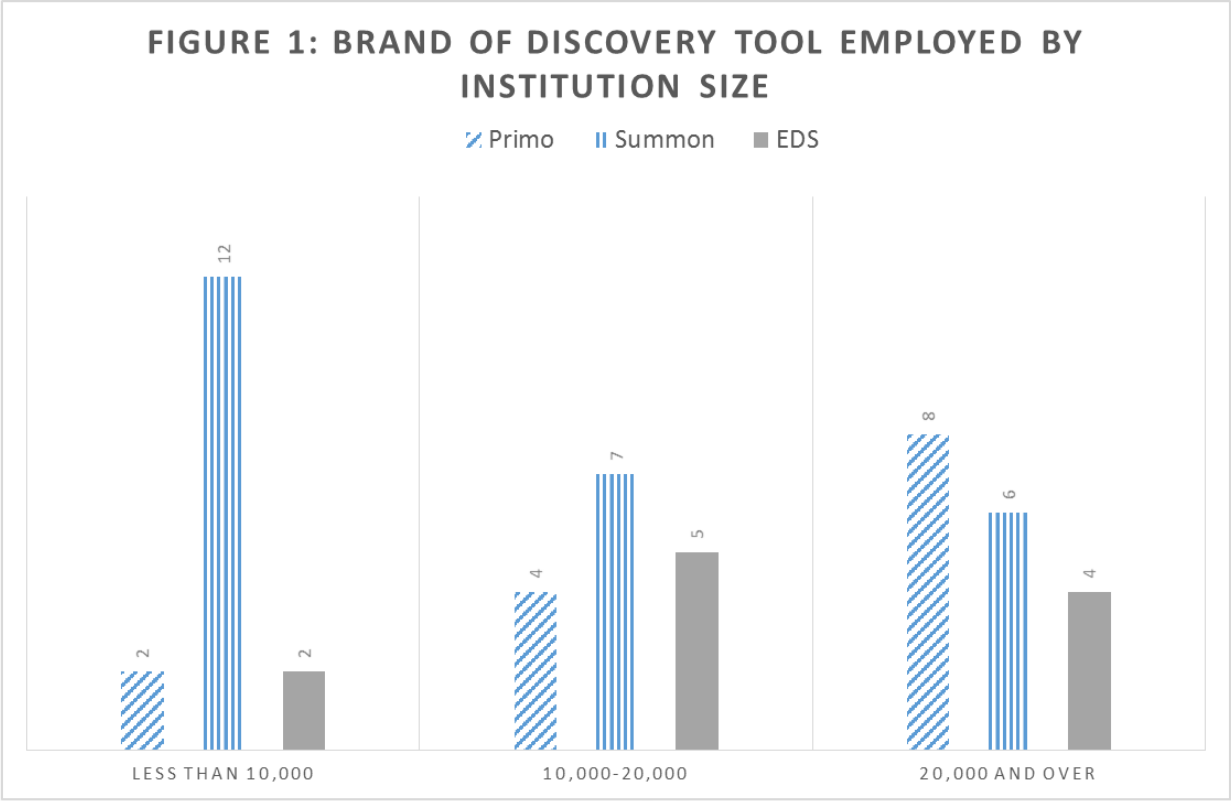

FIGURE 1: Brand of discovery tool employed by institution size.

Institutions using Primo tended to have the greatest number of library staff/faculty working on the administration and governance of their discovery tool. Institutions using EDS reported dedicating fewer staff resources to the maintenance of their discovery tool and reported oversight groups or committees less commonly than libraries that have chosen Primo or Summon. Primo and Summon users reported having discovery tool working groups or committees more commonly than those libraries that had adopted other discovery tools. No evidence was found in the literature regarding the reasons for these administrative differences based on discovery tool vendor. One hypothesis that could be explored in future research is whether or not some discovery tools are more complex than others, and thus require more or less investment of staff time. An alternative hypothesis, which would fit with the experience of the authors' library,

would be that some discovery tools allow for greater customization, and thus have the potential for greater investment of staff time, according to the needs and resources of the institution.

Discovery Tool Operations and Maintenance

The first research question, which asked how academic libraries approach the implementation, maintenance, and technical support of their discovery tool, was designed to gauge trends in the operations and maintenance of discovery tools. Although this question does not provide an opportunity for lengthy analysis, it does lay the foundation for the final research question regarding libraries' practices in relation to perceived success and failure of discovery tools. Survey questions were designed to gather information on libraries' approaches to the implementation, maintenance, and technical support of their discovery tool. Questions related to this theme included the choice of discovery tool, the organization and responsibilities of library staff, the existence of technology positions, the outsourcing of any maintenance or operations work, and the establishment of committees focused on the operations and maintenance of the discovery tool.

All respondents hailed from institutions that have implemented a discovery tool, as this was a criterion for inclusion in the study. Most reported having had their discovery tool at least 3 years, with a significant portion of these (27 percent) reporting have had a discovery tool for five or more years, 29 percent reporting three years, and 9 percent reporting four years with their discovery tool. A smaller portion of respondents reported having had their discovery tool for two years (16 percent), one year (5 percent), or less than one year (13 percent).

Almost half of responding institutions have a standing committee (45 percent) dedicated to oversight of the discovery tool. This is closely followed by the number of respondents who reported not having such a committee (38 percent). Open responses indicated that some institutions only employed such a committee during implementation (3 of 8 open responses) or that they have an unofficial or loosely formed governance group. A small proportion of libraries (18 percent) had a "Discovery Librarian" or a similar position primarily focused on discovery tool administration; most (68 percent) did not. Rather, most libraries have a number of librarians or staff who share responsibilities for the discovery tool's maintenance and administration. This survey also found that most libraries (57 percent) were not using external support for administration of their discovery tool, but of those who do employ help from outside the library, the most common option was the product vendor (25 percent), followed by campus IT (9 percent). Other options cited were consortial administration or other centralized IT.

The survey data indicate that most of the participating academic libraries are investing staff resources in the maintenance and operations of their discovery tool. Slightly less than half of participating libraries employ a standing committee that is responsible for the operations and maintenance of their discovery tool. This leaves all other libraries in the survey with an operations model run by either a few library staff members dedicated to the maintenance and operation of the product or a combination of outsourced maintenance and in-house oversight.

The literature on discovery tool operations includes several detailed and insightful guides to the selection and initial implementation of discovery tools. Popp and Dallis (2012) compiled a large and wide-ranging volume of papers designed to help libraries organize and prepare for the

selection and implementation of a discovery tool. Breeding (2014) provides detailed technical profiles of the major discovery tools available on the market. However, no literature exists on best practices for organizing staff and technology resources for ongoing maintenance projects such as evaluating and implementing vendor updates and enhancements, reaching decisions on advanced customizations, applying fixes, and ensuring compatibility with other systems. While thoroughly vetting, selecting, and implementing a discovery tool is important, careful consideration must be given to its ongoing maintenance and operations. Comments gathered from this study's open-ended questions emphasized the importance of responsible maintenance for the discovery tool and pointed out that insufficient staffing and technical support can be disastrous, in the words of one respondent, "One conclusion many agreed on was that libraries do need to have staff dedicated to the discovery systems implemented. Insufficient staffing leads to lack of technical support for a discovery system as well as lack of advocacy for it."

Discovery Tool and Instruction

The second research question asked about prevailing trends in the presentation of discovery tools in library instruction. To answer this question, participants were asked a series of questions involving their instructional practices with discovery tools. These questions included the number of students reached in their information literacy program, whether librarians are required to teach students how to use their discovery tool, how students are taught to use their discovery tool, and the number of librarians teaching the discovery tool to upper-division students. Similar to Buck and Steffy's (2013) research study, the data collected from this survey found that academic librarians are typically not required to teach their discovery tool, typically teach the discovery

tool to lower-division students, and commonly teach students to use their discovery tool at the beginning of the research process to conduct broad searches.

A large number of responses (68 percent) revealed that librarians were not required to teach discovery through their information literacy program. Instead, responses indicated that the decision to teach the discovery tool falls to the discretion of the librarian. Several respondents replied that librarians elect to teach discovery in their information literacy sessions, while other respondents noted that teaching discovery depended on the class focus and may be more typical in undergraduate sessions than graduate-level research classes. These findings reflect some of the trends observed in previous studies. While some library instruction programs make program-wide decisions regarding promoted resources (for example, Avery and Hinchliffe 2014), the number of librarians who are required to teach a discovery tool is small. Kulp et al. (2014) found that 5.9 percent of librarians teaching "one-box" searching were doing so because they were required. Instead, instructional autonomy is the norm, as confirmed by Buck and Steffy (2013).

The function of the discovery tool, as taught in library instruction, varies depending on the instructor, as noted by 75 percent (n=42) of respondents. Using the discovery tool to begin research with broad searches was the function most commonly identified (63 percent, n=35). Less-common functions taught in library instruction included searching for additional sources after database searching to ensure a comprehensive search (29 percent, n=16), searching for the full text of a known item (20 percent, n=11), and searching as a backup option if database searches have been unsuccessful (20 percent, n=11). As librarians may choose to teach multiple functions of the tool, respondents were able to select multiple options.

The trends in discovery tool instruction uncovered in this survey align with those found in the previous studies and show that most librarians teach the discovery tool to lower-division students by demonstrating a broad search as a launching point for research (for example, Buck and Steffy 2013). Verifying these trends can be useful for libraries trying to figure out how to integrate discovery tools into their instruction programming. Equally important to instruction librarians are the narrower recommendations for discovery tool instruction derived from usability testing. Nichols et al. (2014) and Fagan et al. (2012) point out that librarians should especially focus on issues such as how to deal with large results lists and how to use facets to narrow search results.

Web Presentation and Presence

Discovery tools tend to have a prominent and highly visible position on the websites of respondents' libraries. Research studies by Teague-Rector and Ghaphery (2008) and Gross and Sheridan (2011) demonstrate that prominent placement of a discovery tool search box on the library home page increases the use of the discovery tool. Because anecdotal experience based on visiting many academic library websites suggested that most provide access to their discovery tool from the homepage, the third research question of this study sought to uncover additional trends in the presentation of discovery tools on academic library websites. As libraries may choose multiple avenues to present their discovery tool online, respondents were able to select multiple response options. Beyond the library homepage, respondents reported their discovery tool could be found on supplemental library web platforms such as LibGuides (77 percent, n=43) and on secondary pages within the library website (61 percent, n=34). Learning management

systems, such as Blackboard, Canvas, and Moodle, were also identified as a relatively common place for presenting a discovery tool (32 percent, n=18).

To evaluate the relationship between discovery tools and online public access catalogs (OPACs), respondents were asked to describe the positioning of access points to their OPAC. The majority reported that their OPAC was publically available, but in a position that was secondary to the discovery tool (54 percent, n=30). A much smaller proportion (14 percent, n=8) reported that their discovery tool was available with equal prominence to their OPAC and an equally small number (14 percent, n=8) reported that their OPAC had been discontinued or was no longer actively maintained. Very few libraries (9 percent, n=5) gave priority to their OPAC by presenting it as the primary search interface on their homepage. The decision to highlight the discovery tool as the primary search tool on the homepage most likely contributes to increased use by students. As one respondent noted, "We do not provide instruction in the use of the discovery tool, but students seem to use the search box on the database list page because it's the first thing they see."

Overall, most of the libraries surveyed provide access to their discovery tools through platforms such as learning management systems and supplemental library web platforms, in addition to their library homepage. Most participants also noted that their discovery tool is more prominent on their website than their OPAC. This additional online exposure and prominence can be expected to promote the use and impact of discovery tools.

Assessment and Evaluation

The fourth research question asked how academic libraries measure the overall success of their discovery tool. To answer this question, respondents were asked to identify the methods and demographics they find most important for assessing and evaluating their discovery tool. As libraries may employ multiple methods and seek information from a range of demographics, respondents were able to select multiple response options. The most popular options were informal feedback from students (82 percent, n=46), informal feedback from faculty (71 percent, n=40), informal feedback from librarians (68 percent, n=38), usability testing (66 percent, n=37), and usage data (70 percent, n=39).

When asked which methods their libraries had actually used to assess their discovery tool, respondents tended to select the same as above, but in slightly lower numbers: informal feedback from students (79 percent, n=44), librarians (79 percent, n=44), and faculty (68 percent, n=38), usability testing (54 percent, n=30), and usage data (64 percent, n=36). Participants were able to select multiple response options.

The collection of formal feedback from user groups was not identified as a widespread practice. Of fifty six respondents, 30 percent (n=17) surveyed students, 25 percent (n=14) surveyed faculty, and 20 percent (n=11) surveyed librarians; however, respondents did place a high value on formal feedback to gauge the significance and impact of the discovery tool. (The survey did not prescribe a definition of "formal feedback", but suggested polls and surveys as possible methods.)

A low number of respondents reported not having done assessment at all. Comments suggested lack of time was one reason for this. In the words of one respondent, “lifes [sic] too short.”

Several previous research studies can serve as a guide for libraries which seek input on their selection and evaluation of a discovery tool. Usability studies may inform decisions on customizations, upgrades, and the presentation of discovery tools in instruction and online (for example, Comeaux 2012, Fagan et al. 2012, and Nichols et al. 2014). However, findings from published usability and assessment studies are not able to take into account the nuances of each individual institution such as unique discovery tool customizations, special and local collections, and differences in curricular and research needs. As noted, while many survey participants indicated that they value formal feedback, most have not engaged in it. In order for each institution to take full advantage of the customizations available in their discovery tool and to make informed decisions on how to present their discovery tool to their users, libraries should conduct their own assessment on a regular basis.

Users of Discovery Tools

To better understand the data gathered describing librarians’ perceptions of discovery tool success, respondents were surveyed on their perceptions of users’ adoption of discovery tools. Respondents were asked to estimate the use of their discovery tool among three key demographic groups: students, librarians, and faculty. Librarian’s perceptions of users’ behavior, as opposed to directly measuring these populations’ behaviors, are a convenient and accessible sample of information.

Respondents reported high rates of adoption among librarians and students, and a much lower level of use among faculty. According to the survey data, at 55 percent of libraries, most or all librarians (60 percent-100 percent) were using the discovery tool. The same percentage of libraries reported discovery tool use by most or all students. In contrast, only 13 percent of libraries reported use by most or all faculty (see Figure 2).

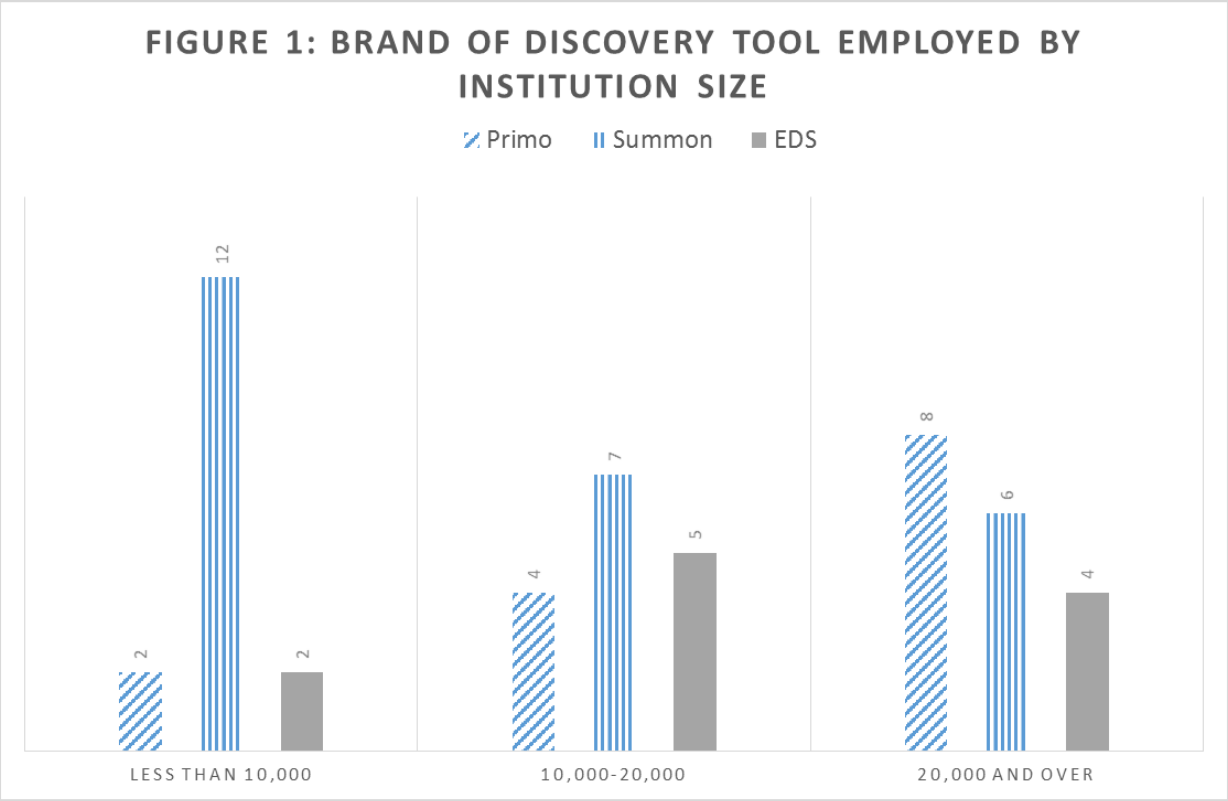

FIGURE 2: Participants' perceptions of discovery tool use by user groups.

Notably, 38 percent of respondents gave "No answer" to the question of discovery tool use among faculty. This may be due to the fact that most respondents were directors of instructional units and felt unable to estimate faculty use, perhaps due to less communication with that group about their research habits.

Similarly, the data on assessment methods indicated that formal and informal feedback from faculty is used less frequently in assessment than formal and informal feedback from students. The greater use of student feedback may indicate that student use is valued more highly than faculty use when students are considered the most important target group for discovery tool use and are the main recipients of library instruction. As a result, it makes sense that librarians consider student uptake and feedback of primary importance.

Respondents' Perceptions of Success

The final research question asked which, if any, practices yield perceptions of success with discovery tools. Participants were asked whether they viewed the implementation of their discovery tools as successful, with the response choices "yes", "no", and "reserving judgement", and were also encouraged to comment on their response. The term "successful" was intentionally left open to the interpretation of the individual respondent in order to encourage participants to think about what success with discovery means to them and their institution. Data from the first four research questions and comments related to those research questions were also used to analyze which practices lead to perceived success or failure with discovery tools.

The highest percentage of respondents (45 percent) considered their implementation to have been a success. Yet, this was closely followed by respondents (36 percent) who indicated that they were "reserving judgment." Relatively few respondents (11 percent) did not consider their discovery tool implementation to be a success.

Respondents elaborated on their experience of implementing a discovery tool through an open comment option. Among those who answered "yes" to the success of their discovery tool, many wrote that initial implementation had been difficult but that conditions had improved over time with diligent customization and maintenance work:

- "There's room for continual improvement and the first couple of years were rough, but things are fairly smooth now."
- "It has improved immensely over the years, and we continue to improve it ourselves and in conjunction with our vendor. I don't expect that we'll ever be 'done'."
- "Qualified yes - we continue to conduct user testing and make improvements/modifications."
- "It's been bumpy as we were fairly early adopters, but in the last year I would say it has gotten more stable and reliable. It's definitely not perfect and we can't drop our catalog yet."
- "I'm not the one to see the stats, but in instruction and reference terms, seems pretty successful."
- "It took longer than we thought originally, but has been easy since."

Among those who gave a negative response regarding the success of their discovery tool, several appeared to have implemented without significant vendor support and did not invest enough of their own resources in customization and administration, with adverse effects on the discovery tool's performance:

- "I'm not sure how this happened, but we implemented EDS and rather abandoned it. And it was implemented in a rather horrible way, so it really didn't work well. But students are

using it. So we're now working with EBSCO to set us up better, and now it's working OK. As a librarian I'm starting to use it to find full text from citations. But we aren't ready to teach it yet and we haven't thought about the implications for teaching it. Yet."

- "We messed with the settings too much and either because of this or because EDS is hard to work with, we have lame relevancy ranking."

Among those who were "reserving judgement", comments were more diverse. Some described a situation of ongoing configuration, with some dissatisfaction about their tool's current state of development, and spoke to the continued need to reconfigure settings. Others described frustration with a low level of adoption among librarians and with the presentation of their discovery tool.

- "We have been working to eliminate glitches and add features that make it even more intuitive to use. I would consider that aspect to be successful. Most librarians are still not using it and we are not teaching it in first-year writing information literacy classes yet."
- "We don't have total control of our tool. Much work remains to be done with normalization rules to increase functionality."
- "Use it more as it evolves"
- "I have misgivings about both the tool and the way we present it to students and faculty online, but hope it will be altered to be more user-friendly"
- "It is working well in many respects but full text linking (link resolution) is still a major problem in that some materials that we have in FT online don't show as such or link as such. Also print journal articles don't show as such in the discovery system but instead show as "Full text not available."

Librarian Resistance

The final survey question invited respondents to share comments. This question was open-ended, with minimal direction provided, in order to draw out important information that the other, highly directed questions might have missed. Several participants used this final open comment question to describe why some of the librarians in their institution either reject or resist the use of their discovery tool.

Research has demonstrated that most librarians are willing to use their discovery tool in instruction (Buck and Mellinger 2011; Fawley and Krysak 2014; Kaufmann et al. 2012). However, there are a range of persistent criticisms that motivate objections to discovery tools that were also found in this study.

Of the 25 open comments, eight described factors that were perceived as discouraging the adoption of the discovery tool in research and instruction. The comments indicated behavioral factors such as librarians needing to go beyond their current technological skills and pedagogical approaches.

- "...The tool also requires librarians to go outside of their own comfort zone of skill-based teaching of databases and develop new methods of interacting with students."
- "First impressions are hard to shake. As long as the catalog is accessible, librarians we'll (sic) often resort back to it."

Resistance to discovery tool use among librarians was also related to a discouraging initial implementation, a perceived lack of inclusion in the selection and implementation process, and a pedagogical approach that minimizes "teaching the tool."

- "Bear in mind that many people who do instruction don't teach "tools." We actually spend more time discussing the critical thinking aspects of why one tool is better than another or would serve our purposes better. In light of that a discovery tool is merely background research on a topic you know very little about and is merely one step in the research process. And a step that can oftentimes be skipped."

Other comments consisted of complaints about their discovery tool's technical performance, such as the inclusion of items not owned or licensed by the library in search results, known items not appearing in search results, and inconsistent link resolution. These complaints might circle back to the issue of insufficient technical support. These issues can often be resolved through collaboration between the units responsible for systems, cataloging, and electronic resources management.

Study Limitations

The technological features and performance of discovery tools, as well as the circumstances of local implementations, are in a constant state of change, and the findings from the survey are only able to provide a snapshot of perceptions and behaviors. Following a first wave of discovery tool adoption around 2011-2015, some libraries are evidently re-evaluating their product and some are making the decision to switch to a different one. Also, institutional circumstances may shift. Personnel resources may change, adoption levels in instruction or among different user

groups may rise or fall, and libraries reserving judgment about their tool's overall performance might move to a positive or negative evaluation.

This study is primarily quantitative and incorporated a small set of qualitative data so as to map trends across academic libraries. A qualitative or truly mixed methods study might shed more light on the information that this study uncovers and could focus on some of the themes uncovered from this study in more depth.

The survey targeted heads of reference and instruction departments from land-grant, research-intensive, and ARL libraries, but many participants declined to respond to questions relating to faculty and their use of discovery tools. Further perspective might be gained by directly engaging groups such as students and faculty. Alternatively, academic librarians who are not department heads and who are involved in departments beyond reference and instruction could be surveyed.

Future Research

This study examined operational and pedagogical practices relating to discovery tools at academic research libraries. One additional avenue for future study is how faculty, researchers, and graduate students are using discovery tools to conduct research. This future research could examine if discovery tools radically change research behaviors and the visibility of information sources. In addition, exploring what the best practices are for supporting discovery tools could maximize their potential for research. Studies that investigate and review the research and instruction practices of early discovery tool adopters might shed some light on these questions.

This study also revealed that most reference and instruction department heads are making judgements on their discovery tools through informal feedback from librarians, students, and faculty. The authors see research opportunities in formal research on user feedback through longitudinal anthropological studies, usability studies, and tool effectiveness studies. Through formal research studies, much of the bias and emotion that fuel both negative and positive perceptions of discovery tools can be eliminated, and findings can be shared across the profession.

The impact of discovery tools on search practices and search results, as well as the impact on library instruction, has been explored to some extent. There is less knowledge of how the adoption of discovery tools has disrupted library staffing models and systems administration. How much staff time is dedicated to the administration of discovery tools? What is the opportunity cost in terms of reduced maintenance of other systems and services? Have discovery tools changed the way libraries approach the acquisition and retention of resources and applications?

As seen in this study and others, most libraries are not requiring librarians to teach the discovery tool in instruction. Also, previous studies reveal resistance to discovery tools among some reference and instruction librarians. The unsurprising consequence appears to be inconsistent adoption of discovery tools in library instruction as shown in this study as well as others (Buck and Steffy 2013; Kulp 2014). This raises questions for future research of whether library users experience a disconnect between the tools positioned on the library website and the research

guidance they receive from librarians, and whether any such disconnect has an adverse effect on actual information-seeking and research.

Comments that pointed out librarian resistance towards discovery tools cited factors such as a perception of exclusion from decision-making related to implementation, various technical issues, the opacity of the tool's mechanics, and the demands of learning a new system. More library-focused studies, such as the one conducted by Aharony and Prebor (2014), that examine the psychological, cultural, and organizational factors of adopting new technology would be useful in preparing for future major systems adoptions and workplace culture transformations.

To build on the findings from the current study, the researchers envisage a follow-up study to see how respondents perceive the success of their discovery tool in a few more years. Have those who were reserving judgement made up their minds? If so, what factors helped them reach their conclusions?

Conclusion

Implementation of a discovery tool is a tough process, but libraries that have stuck with their commitment to the discovery tool, allocated staff resources to it, integrated it into instruction and public services, and have made appropriate cultural and technical adjustments, reported satisfaction with their discovery tool. Persevering through a tough implementation was no easy feat. Most respondents who were satisfied with their discovery tool also indicated that the initial implementation was painful, required significant effort and patience, and took time for librarians

to accept the discovery tool. Significant staffing resources were required for administration, enhancement, and instruction, in order to achieve a sense of satisfaction.

For those libraries that did not have the internal staffing resources to dedicate to discovery, frustration ensued. Therefore, it would behoove vendors to assist adopting libraries by supporting administration and customization, by communicating transparently with librarians about configuration and performance, and by supporting the development of best practices for implementation. The challenges of the initial implementation period may also explain why so many respondents remained undecided on the success of the implementation of their discovery tool.

Discovery tools do not meet the needs of all library users and all information-seeking tasks. They tend to be a tool that supports preliminary, general, and lower-division research, as well as known-item searching. But importantly, the one-stop search model is one that students seem comfortable using. This brings a more theoretical question to the forefront: should libraries spend significant time and resources to implement a research tool primarily because students are comfortable adopting it? Perceived levels of use among faculty are still comparatively low. However, for many of this study's respondents, this was a less important factor in their evaluation of success. Instead, it seems reasonable to infer that students are considered the primary user group for discovery tools, and student practices and attitudes are often the determining factor in libraries' evaluations of discovery tool success.

Configuration, launch, and initial implementation are only the first steps in a longer process of technological, operational and instructional adoption. Library administrators need to look beyond the technical maintenance and customizations associated with discovery tool implementation. Significant operational, pedagogical, and attitudinal changes may be necessary to successfully adopt discovery tools and overcome the disruption they may cause.

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