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Enhancing library discovery: An approach to understanding user access to electronic resources

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ABSTRACT

The exponential increase in electronic resources in parallel with the development of discovery systems has expanded the research environment for library users well beyond the traditional library catalog. In response, a large public university library grapples with the best ways to deploy research tools to provide access to the many electronic resources it licenses for its users. Library staff seek to direct users most efficiently to needed resources, to save staff time, and to contain costs. The authors used a variety of methods to gather data to support their decision making, including search log analysis, surveys of other institutions, interviews with students, and cross-departmental discussion within the institution. The library made improvements to the website and search tool interfaces as well as developed a new approach to loading MARC records for electronic resources to the library catalog, which resulted in a slimmed down catalog paired with a newly promoted discovery system. This analysis is intended to inspire other libraries to develop a more deliberate approach to providing access to electronic resources.

Introduction

East Carolina University (ECU) is a large public university located in Greenville, North Carolina. ECU offers 175 degree programs and includes a medical and dental school. It has a full-time enrollment of close to 27,000 students and employs over 2000 faculty. ECU provides a large selection of online programs and courses. There are three libraries at ECU: Joyner Library, Laupus Health Sciences Library, and A.J. Fletcher Music Library. In total, the libraries maintain a budget of around 4.5 million dollars for electronic resources. ECU is a member of the Carolina Consortium and NC Live and licenses resources through both consortia. ECU Libraries' collections contain over 176,000 electronic journals and 1.8 million ebooks. The libraries also provide access to close to 500 databases.

Like most academic libraries, ECU Libraries utilize various services to provide access to and manage electronic resources, including a discovery service, online journal portal, link resolver, A-Z database list and a library catalog (Zmau & Talbott, 2022, p. 6). Since 2009, the libraries have employed the SirsiDynix Symphony ILS as their bibliographic database. In 2010, the libraries began offering Summon as their discovery service branding it "One Search" as the place to search for "almost everything." The libraries also utilize Ex Libris 360 Management Services for the ejournal portal and link resolver, both of which are provided with a Summon subscription. CORAL, an electronic resource management system, was implemented in 2013 and serves as the back end of the A-Z database list. Blacklight was implemented in 2017 and serves as the public facing catalog. Users therefore are presented with several options for searching for and accessing electronic resources and library staff manage the electronic resources workflow in multiple systems.

When the libraries began licensing electronic resources in approximately 2002, MARC records for ejournals and ebooks were added to the library catalog. At the time this was the only method for the public to find these resources. Since then, the Symphony library catalog database has continued to grow and at the time of this writing, records for electronic resources comprised 56 % of the Symphony database. In 2024–2025, electronic resources accounted for 80–85 % of the libraries' budget, which is in keeping with Marshall Breeding's (2023) determination that electronic resources "now [represent] about 80% of the collection budget of a typical large academic library" (p. 21). This exponential growth in electronic resources combined with improvements in Summon, such as the launch of the Central Discovery Index (CDI) in 2019, are what led us to re-evaluate our discovery environment to provide the best access to this set of resources. While Library Services

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Platforms (LSPs) have become increasingly popular in academic libraries for their ability to integrate electronic resources and could potentially alleviate some challenges faced at ECU Libraries, they too come with their own unique set of challenges, including complex and inflexible workflows and weakness in managing print resources (Breeding, 2022a). Additionally, there is the consideration of the quality of metadata for some electronic resources in the central knowledgebases for these platforms. Our research focused on identifying strategies to improve access to online resources given the specific circumstances at our library and the tools that it uses right now.

The need for change came from several sources. Electronic resources personnel frequently received questions from library staff about the best places to search for resources of a specific format. Librarians routinely observed confusion over the variety of search tools made available on the library's homepage, specifically uncertainty over the difference between the traditional library catalog and One Search. Terminology also posed challenges for students, particularly students not familiar with library discovery and in the beginning stages of academic research. ECU Libraries' experience matched the findings of McDonald and Trujillo (2024) on library terminology and its impact on the usability of library websites, specifically when it came to the library catalog. "One reason for the difficulty of understanding the term 'library catalog,'" they noted, "may relate to a growing confusion between the library catalog … and a library discovery service" (p. 918).

The electronic resource workflow is time-consuming and involves many hands. It starts when a notification is received from the Acquisitions Department that a new resource has been acquired, and Electronic Resources staff set holdings in the knowledgebase for resource discovery in One Search. The electronic resources librarian and electronic resources cataloger determine the best source of MARC records, if they are available. Consideration must be given to metadata quality to ensure optimum discovery of the resource. In describing their process dealing with records for electronic serials, Ogier et al. (2013) shared that their "overarching goal was to balance the quality of the bibliographic records with ease of ongoing maintenance" (pp. 100–101). That same concern was reflected in our questions: Are the 360 MARC records sufficient, or does the provider offer better quality MARC records? If staff decide to use records from the provider, what will the maintenance schedule look like? MARC records must also be updated to the local library's cataloging standards, often including updating URLs, modernizing cataloging, adding local information, adding subject headings, and performing authority work. Mugridge and Edmunds (2012) described the "heavy workload" that keeping up with provider record updates and performing quality control on provider records places on libraries (pp. 155–156), a burden that has not lessened since 2012.

Another impetus toward change is that the libraries' contract with SirsiDynix stipulates a bibliographic record cap, the exceeding of which causes a subscription increase. Loading records for the exponentially growing collection of electronic resources necessitated repeatedly increasing the record cap and incurring increasing subscription costs. Also, for some electronic resources, loading MARC records causes duplication in One Search results, because the metadata does not contain sufficient match points to ensure they matched and merged with CDI records. Moore (2016) echoed this finding and emphasized the importance of reducing such duplication as much as possible to improve discoverability.

Objectives

To address the question of how best to deploy research tools to provide access to the many electronic resources licensed by the libraries, three objectives were developed:

1. Examine how users access electronic resources. Components of this include evaluating the homepage and services offered and investigating improvements; considering placement and labels of One Search discovery and other search tools.
2. Create a decision tree outlining how access to electronic resources will be provided based on format type, acquisition type, access type, and length of access. This decision tree would make the multi-department process more streamlined and predictable.
3. Address the growing number of records in the Symphony library catalog database by looking at whether alternative points of access would be sufficient.

Literature review

A literature review shows that ECU is not alone in facing challenges when it comes to making online content available to their users. Prior studies examining these challenges focus on transaction log analysis, user search behavior, and the impact of web design. Reviewing the literature of these three areas provided us with many practical avenues to pursue in our research. No published authors framed their objectives exactly as we did, but several suggested possible methodologies as well as broader issues.

Transaction log analysis

Yu and Young (2004) noted that there is a long history of using transaction log analysis to study how online catalogs are used. Employing this technique, they focused on analyzing subject searches. A study conducted by Moulaison (2008) analyzed all searches conducted on The College of New Jersey's online catalog on three separate days. Results revealed significant patterns of user behavior and a troubling percentage of failed searches, prompting suggestions for improvement to their catalog. Trapido's (2016) study at Stanford University Libraries examined failed searches specifically, using three substantial datasets, one which established categories of use, a second of failed searches, and the last of submissions by users to a feedback link. Analysis revealed several types of errors that led to failed searches, some of which were due to users' expectations for how a library discovery tool should work. Trapido suggested that discovery tools accommodate all levels of users and should be continually assessed and improved to reflect changing user needs. The analysis of a semester's worth of searches at the University of Houston Libraries, conducted by Brett et al. (2015) concentrated on the use of their online catalog's tabbed-search interface, the results of which prompted improvements to it. A sophisticated clickstream data analysis was performed by Jiang et al. (2017) on Chinese academic libraries, revealing patterns of user behavior like those found by Moulaison. Transaction log analysis appeared to offer a straightforward approach to begin addressing our concerns.

User search behavior

Other studies examined how users search for electronic resources, either by conducting tests involving users to observe how they search, by asking them directly, by asking the library staff who interact with them as they seek electronic resources, or by using a combination of these approaches. As Clark and Yeager (2018) noted in their observation of the searching behavior of music students, "Librarians typically possess a keen interest in how patrons find needed materials" (p. 111). They asked a small sample of students to perform a usability test and complete a follow up question, which showed that music scores were more difficult for students to find than media, suggesting that format was a variable for us to keep in mind. Another study involving students in a specific discipline, this time Social and Behavioral Sciences majors, took place at California State University, Monterey Bay, where students were asked to search for articles in three search tools. Analysis in this study focused largely on the use of facets in searching (Dahlen et al., 2020). Davis and Song (2020) at North Carolina State University Libraries focused specifically on how students go about finding ebooks. Their paper provided

a useful template for collecting data from students. A more general survey was conducted by Fry and Rich (2011) at Bowling Green State University, using only fifteen graduate and undergraduate students, who participated in a five-part study to determine how they used the library website to find electronic resources. Sisler (2020) reported on the steps Ohio University Libraries took to improve their discovery service, which included a segment on the importance of student searching behavior to that effort. Student workers were asked to perform four search tasks using different types of electronic resources and their responses were documented. Both this and the previous article provided tips that were helpful to us in formulating and conducting our own usability testing. A study by Bardeen et al. (2017) was of interest to us because the University of North Carolina at Chapel Hill uses Summon, the same discovery tool as ECU, although their focus was on discoverability of ebook collections and those searching were members of their Ebook Working Group rather than students. Hill (2020), at University of North Carolina at Greensboro, described a case study she did involving technical services librarians in usability testing. The methodology Hill employed, which involved asking random students to perform a series of searching tasks, was instructive to us as we developed our research plans.

Impact of web design

Much research on user search behavior makes clear the impact of web design on user success. How access to discovery tools, library catalogs, and electronic databases is organized and presented to users on the web can have a major impact on which interface they select and on what searching decisions they make. Pennington (2015) observed that "Academic library websites are complicated," (p. 194) and often designed around the systems within them rather than being research or user-centered, which is true in our library. According to Haggerty and Scott (2019), user experience design, which encourages simplicity, is somewhat at odds with the educational mission of universities to promote critical thinking. Their study at the University of Memphis, University Libraries, focused on the efficacy of the single search box, as opposed to format-specific approaches. Lown et al. (2013) noted in their study of the use of a single search box that "the library search experience must be designed carefully to balance user needs and expectations with the capabilities of library information systems" (p. 240). Following up on his 2015 article, Pennington et al. (2016) drew on the expertise of four librarians involved in user experience. Their paper offers practical suggestions, including illustrations, on soliciting student interest in participating in usability testing and in potential web redesign that helped us formulate our methodology. Noting that specialized jargon that libraries and librarians use can be an impediment to users, McDonald and Trujillo (2024) reviewed John Kupersmith's frequently revised best practices for using library terms against the results of their usability study, determining that his guidance remains applicable for academic library websites. Furthermore, as Ochoa (2020) noted in her research, terms commonly used on library websites "such as 'catalog,' 'reference,' and 'research guides' are still difficult for users to understand" (para. 7) and adding tips or natural language can help users navigate the multitude of search options on the website. Beyene and Ferati (2017) assessed the feasibility of using adaptation to improve discovery tools on three parameters, that of the interface, the information itself, and navigation, addressing them from both usability and accessibility aspects. The analyses and suggestions gleaned from these studies formed the basis of our multi-faceted approach.

Methodology

To address our objectives, we needed to find out more about how our users attempt to find electronic resources. We also wanted to find out from other libraries that maintained multiple search interfaces how they envisioned the purpose and limits of each interface, particularly with respect to electronic resources. Because no one method of inquiry addressed all these needs, we employed several methodologies to discover this information.

First, we attempted a search log analysis for the Blacklight library catalog and the One Search discovery tool for the months of January–April 2021. We abandoned the strategy of examining search logs rather quickly, however, because it was impossible to use the search logs to determine how the users refined their searches, or whether they ultimately found what they were looking for. Also, because we ingest our library catalog into One Search, it was not possible to differentiate searches entered directly into the Blacklight interface from those passed from One Search. Log data did reveal that from October 2021 through August 2022, One Search was used on average five times more than the catalog. This led us to conclude that users either preferred One Search or simply defaulted to it because they noticed it first.

Next, we created a survey instrument to gather information from other institutions which provided the public with both a SirsiDynix Symphony catalog and the Summon discovery tool. Our main motivation in contacting other libraries was to generate a list of decision factors that libraries use to determine which electronic resource records to load to the catalog, when there is also a discovery tool available. Although the simplest way to do this would have been to conduct a general survey circulated on library listservs, we worried that survey fatigue would lead to too few responses. Instead, using the search interface provided by Library Technology Guides, we assembled a list of twelve other academic institutions including public and private colleges and universities that met our criteria (Breeding, 2022b). We contacted the individuals who seemed likely to be responsible for decisions regarding catalog and discovery layer content to ask how they used these tools together to provide access to electronic resources. Aside from their choice of search tools, most of the institutions bore little in common with ECU. Because of this, we decided to add three institutions from ECU's peer list (East Carolina University, 2020). We emailed 15 individuals in May and June 2022 with seven questions designed to reveal the factors the libraries considered when deciding whether to load MARC records for electronic resources into the traditional catalog, or to rely on the discovery tool or another tool for access [See Appendix A].

To gather some direct insight into how our users attempted to find electronic resources, we next constructed a brief study in which we interviewed 60 students selected randomly from those entering Joyner Library on three dates in October 2022. Our method was inspired by the quick "guerilla usability testing" described by Davis and Song (2020). We received Institutional Review Board approval and were granted exempt status for this study. Before the interviews, we created four similar "assignments," each containing three tasks: find a certain ebook in the library's collection; find a certain streaming video in the library's collection; and find citations to support a research paper on a certain topic [See Appendix B]. We tested each task to make sure that each was easily answered with a quick search of One Search. We set up tables in the library lobby and employed a library student worker to approach people as they entered the building and ask them if they were an ECU student and if they had 10 minutes to help improve the library. The student sent willing participants to our tables, where we conducted interviews in interviewer/notetaker teams of two, presenting the students with a laptop browser opened to the Joyner Library homepage. The only demographic information we collected from the students was their class (e.g. Freshman, Sophomore, etc.), and after assuring them that we were testing our website and not in any way testing them or their abilities or knowledge, we presented them with the three tasks and quietly observed their process [See Appendix C].

Finally, we conducted individual meetings with public services departments in our libraries to solicit their reactions to our findings and their insights on student search strategies for eresources. Consulting with public services departments was important to us because we wanted to be sure that any changes to the libraries' online tools were made with the full support and participation of everyone, and we recognized that different departments have different needs and insights

to offer. In January and February 2023, we met with our Circulation/Interlibrary Loan Department, Music Library, Teaching Resources Center, Research and Instructional Services Department, Special Collections, and Laupus Health Sciences Library managers. We had developed a set of questions to guide the discussion, although we allowed the groups to give us whatever feedback they wanted. The questions focused on whether our findings about students' search behavior match their experience, how and why the staff in their department use the library catalog, and what the impacts would be on them if some electronic resources were no longer accessible through the catalog, but only through One Search and/or the database list. [See Appendix D]. Each of these research methods provided another piece in the puzzle of user access to electronic resources.

Results of institutional surveys

We received responses from 11 of the 15 individuals we emailed. Of those 11, two respondents indicated they load into the catalog all electronic resource records that are available, and four said they do not load any. Simplicity for the user was a prime factor in most of these libraries' decisions, although they interpreted this in different ways. Those that load all available electronic records felt that allowing users to search as much content as possible in both the catalog and the discovery tool is easier for users. Those that load none said that separating physical items into the catalog and electronic into the discovery tool is most clear to users. These libraries also noted simplicity for library staff as an important factor in their decision but again interpreted that in different ways. One respondent indicated that the library no longer had enough staff to load and remove eresource records from the catalog as access fluctuates, so they removed all electronic resources from the catalog. By contrast, another said that they did not have enough staff to make case by case decisions on resources, so they defaulted to loading everything available. Other reasons to exclude electronic resource records included poor metadata quality, especially broken URL links, and duplication of results in Summon due to the catalog being contained within the Summon results.

The other five respondents indicated that they load only selected records. The most mentioned factor in selection was the resource format, followed by stability of access, acquisition type, discoverability in the Summon CDI, and availability of quality MARC metadata. All five of these respondents noted resource format as a decision factor. The format most often included in the catalog was ebooks, while the format most often excluded was ejournals; one respondent indicated they only load records for ejournals they also owned in print. Paid and stable access resources were mentioned by three respondents as being more likely to be included than free resources or those with uncertain term access. Two respondents said they only load records for items acquired individually and excluded records for eresource packages. Whether a resource is easily discoverable in the Summon CDI or whether loading in Symphony is necessary for the resource to be discoverable in Summon was a factor mentioned by two respondents. Two respondents also noted the easy availability of quality MARC records as a decision factor in which resources to make available through the catalog. Only one institution mentioned that storage limits in Symphony required them to be very selective in what they add. It is easy to see how considerations of the ease of the user and the ease of the staff underlie each of these decision factors. Respondents indicated they load records that users would "expect" to find in a library catalog, or load records that allow their Summon instance to be as complete a one stop shop as possible. They said they do not load records that would require extensive attention from staff as access fluctuated. [See Table 1.]

This survey had many limitations. Our data is obviously limited to the very few libraries we contacted, and points of comparison are limited due to the wide variations in library size. Writing to an individual, while it produced a very good response rate, meant that we may not have chosen the best individual to address our questions. The questions were open-ended and overlapped with one another, leading to responses that were not always easy to categorize or compare. Despite these limitations, though, this survey proved valuable by spelling out several decision factors considered by libraries when adding or not adding electronic resource records to their catalog. It revealed a wide range of approaches to electronic resource access, from the one-stop shop to the deliberately separate physical vs. electronic search tool. It also highlighted how decisions about electronic resource inclusion had been made piecemeal over the years in response to ever-growing and changing formats of resources, and how libraries might benefit from a method of making these decisions more systematically, such as a decision tree. One thing that stood out to us was the number of times "what is easier for the students" was invoked, and how that meant different things.

Table 1
Decision Factors in Loading Electronic Resource Records to Catalog.

Decision factor	Mentioned by # respondents
Format	5
Stability of access	3
Acquisition type	2
Availability of quality MARC	2
Discoverability in CDI	2

Results of student interviews

Our findings from the student interviews were eye-opening. The gratifying part was that students ultimately answered 85 % of the questions successfully. The troubling part was the circuitous route that some took to arrive at a correct answer. Most began by looking all over the library homepage, scrolling up and down as though they had no idea where to begin. After this, about half went directly to One Search, a successful strategy in each case, and most eventually found their way there after trying other tools unsuccessfully. However, their initial missteps made it clear to us that the library homepage was confusing.

The students' search choices were logical even when in error. Some students initially attempted to search for the video using a link for Special Collections or for Database List, or they clicked on the magnifying glass of the university website search in the webpage frame. One immediately abandoned the library homepage and went to YouTube, which of course did not contain this subscription resource. They searched for the ebook by clicking on the link for Free *E*-textbooks or by choosing Digital Collections, which is a collection of locally digitized archival material. Searching for the articles perhaps caused the most confusion, as students looked again in Digital Collections, Research Guides, Database List, or the E-journal E-book portal, which contains a list of titles of ebooks and ejournals, before arriving at a fruitful strategy. Far from being a competitor to One Search, the library catalog was largely ignored by the students. Only a handful of them opened it, and of those who did, most shut it immediately in confusion before attempting to search for anything [See Fig. 1]. What we saw matched McDonald and Trujillo's (2024) finding that there is a long list of library terms that students do not understand, including "E-journals," "Digital Library," "Database," and "Catalog" (pp. 914–917). While our students were admirably persistent, trying multiple methods of searching before landing on a winning strategy, we wanted to nudge them toward the winning strategy more easily. We shared the results of our interviews in November 2022 at a library meeting, which generated a lot of interest and discussion among library staff.

Results of departmental conversations

Conversations with library departments revealed that while students typically turn to One Search first, library staff often dislike One Search and prefer using the library catalog. Staff liked the catalog interface

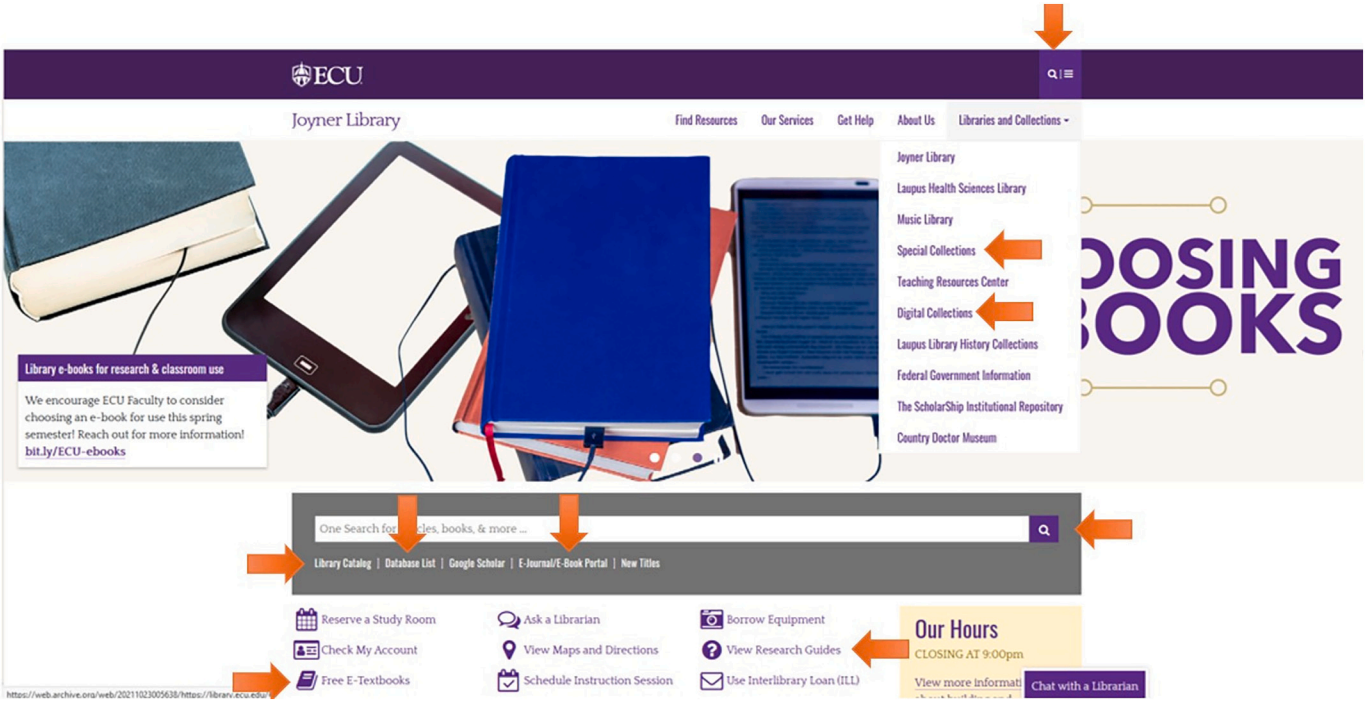

Fig. 1. Old Library Homepage (Joyner Library, 2021) Showing Where Users Clicked.

better, calling it cleaner and less confusing. They found it easier to filter results and easier to conduct browse searches and known item searches, although they wished it were clearer how to access more information about a title, and what to do if your search returned zero results. Often, it was difficult to distinguish which results were available electronically and which were in print. Staff generally did not like using One Search as much because they felt it had too much "noise," the interface was too cluttered, and the large numbers of results were overwhelming. They found that results were often duplicated in One Search, making long results lists even longer. There was also no way to report a problem on a specific page. Our findings echoed the roadblocks to Summon adoption noted by Tonyan and Piper (2019), that, while students are drawn to Summon's simple single search box, librarians were often skeptical of Summon, believing it represented a "dumbing down" of the search process and produced less useful results (p. 3).

Certain library departments said they gear their bibliographic instruction toward the library catalog. To explain their preference, the Music Library cited the need for detailed information to differentiate many works with similar titles, such as Sonata for Piano in C major, Sonata for Piano in C minor, Sonata for Violin in C major, etc. This detailed information is more readily visible in the catalog than in One Search results. If users begin their search in One Search, they must click into a record to get more information, which brings them into the catalog environment. For electronic resources and articles, Music staff typically direct students to search subject specific databases, not One Search. Our Teaching Resources Center makes relatively little use of electronic resources, aside from articles, which they search in education databases, and they make heavy use of the subcollection filters available in the catalog. Our Research and Instructional Services Department, which conducts bibliographic instruction sessions for the widest variety of classes, teaches students to use One Search first, but they said teaching faculty often counsel students to use discipline-specific databases before either One Search or the library catalog. All departments agreed that it needed to be clearer what was contained in each tool, and the language on the library homepage needed to be more helpful.

Changes to homepage and services

Making it clearer where to search for electronic resources involved changes that needed library-wide buy-in because they affect everyone. We turned to the Discovery Advisory Board: a panel of ECU Libraries faculty and staff whose charge is to support the presentation and discovery of collections and resources. We recommended that three short-term working groups be created and tasked with identifying quick, easy to implement changes to improve the Joyner Library website, the library catalog, and One Search. The groups met multiple times over a couple of months to discuss our findings and recommend ways to improve access to resources. For now, we were interested in quick, easy changes, not doing a complete overhaul of our interfaces. Listed below are the various interface changes that have been implemented:

Joyner Library website [See Fig. 2]:

- Removed the large banner image above the One Search box to raise the box to the top of the webpage to make it more prominent and eye-catching, especially in the mobile version
- Changed the background and appearance of the One Search box to make it stand out more
- Added a title in large font to the One Search box, saying "Start here with One Search," and added placeholder text in the search box to help indicate what types of things could be searched
- Arranged links that were in the search box into lists below it to reduce clutter and confusion
- Changed the name of E-journal/E-book Portal to "Online Journals and eBooks" to clarify the purpose of the link and reduce confusion with the terminology
- Removed the New Titles link from the homepage to reduce clutter

Library catalog:

- Made the "Expand your search" option display more prominently
- Modified the "Page doesn't exist" message to include the "Report a problem" link and a route back to the search interface in the library catalog to keep users from reaching dead ends

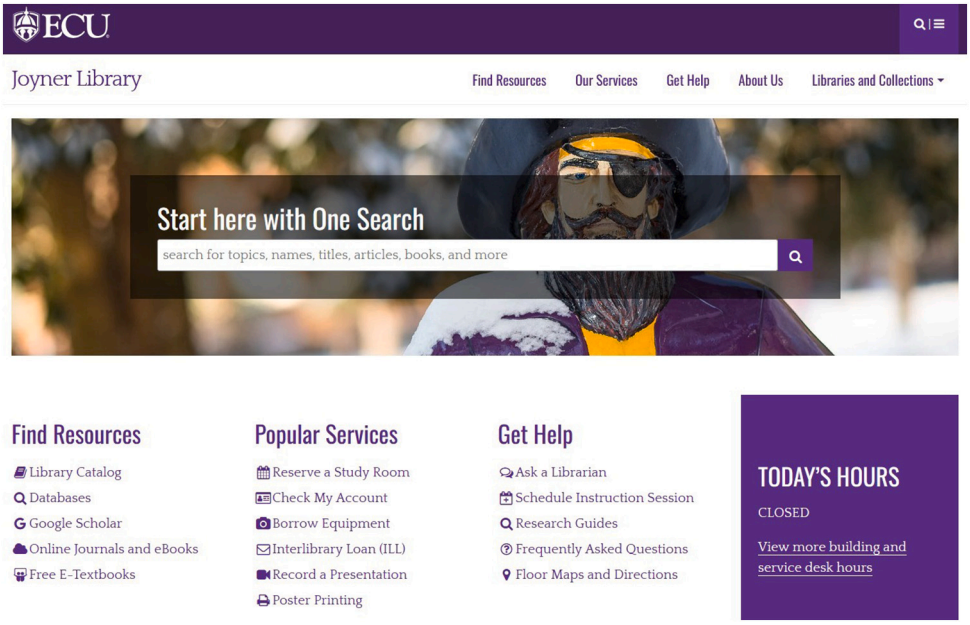

Fig. 2. New Library Homepage (Joyner Library, 2025).

- Updated and expanded format mappings to better identify electronic formats in search results

One Search:

- Removed some facet limiters in One Search that were redundant
- Disabled the topic explorer feature in the One Search sidebar to make the interface less cluttered

Further changes are being considered for the library catalog to provide some additional functionality. Examples of these potential changes include reviewing the fields that display in the "More information about this title" area and hyperlinking specific fields to enable users to find other potentially related materials. The libraries will also need to consider whether the label "library catalog" conveys enough information to users about what may be found there, or if a more descriptive label such as "books and media" is more suitable. These improvements will require some additional discussion by the Discovery Advisory Board. We will revisit One Search to see if there are additional improvements that can be made based on feedback received from library departments. We need to determine what functionality we can incorporate into One Search to make it more user friendly.

Changes to access to electronic resources

We also realized the libraries need to consider making better choices about the inclusion of records for electronic resources in the library catalog. We acknowledged that the approach used when we first started acquiring electronic resources was no longer serving us. In those early days, there were no discovery tools or link resolvers; the only way to provide access for our users was to add MARC records with links in our local catalog. With the technology and indexing that is available now, providing access does not necessarily mean a MARC record is required in the local library catalog. Also, if most students did not turn to the library catalog to find these materials, perhaps it was not necessary to load records for so many of them. By being more deliberate and selective about the inclusion of electronic resources in the library catalog, we could simplify decisions for staff, achieve more consistency, and reduce the number of access points that must be managed.

We looked for generalizations that could be developed into a rationale so that there was consistency in the decision-making process. We attempted to create a decision tree that would detail specific questions to be asked and have the responses to them route library staff to a specific instruction to load or not load records. We examined the following questions and tried to determine the importance and impact of each factor on the decision:

- Do we have perpetual access to the resource?
- What is the format of titles in the resource (books, journals, primary resources, video, other)?
- Does the resource serve a specific user group with specific needs?
- Is there good representation in the Summon Central Database Index (CDI)? (Additionally, what is "good representation" and how can we determine that?)
- What sources of records for the resource exist and what coverage is available?
- What is the quality of the records that are available?
- What do we consider to be good quality records?

Arranging these questions into a practical decision tree proved difficult. When we tried to set a rule, too many exceptions arose. Differentiating the process by format did not reveal enough differences to justify separating workflows. More importantly, coverage levels for a resource in One Search are difficult to determine. The knowledgebase may indicate a percentage of coverage, but we discovered that it cannot be used as a reliable indicator to predict how much of the content will surface in One Search. Titles that are activated in the knowledgebase do not always surface in the discovery tool. Attempts to get clarification from the discovery provider on how accurately this indicator reflected representation in Summon confirmed our speculations that it could not be used as a primary tool to determine exact coverage, only that some level of coverage existed for the resource. This frustrating problem was noted by Bascones and Staniforth (2018) with respect to eresources whose metadata was controlled outside the library: "Neither the publisher nor the system vendor can say with any certainty what we should have access to and in fact do have access to at any given point in a cycle of removals and updates" (p. 11).

A new approach

In lieu of a decision tree, we recommended a change in the general approach to electronic resource records. As a result of our work, we recommended that library staff not add MARC records to the library catalog for electronic resources unless there is an articulated reason to do so. These reasons include:

1. The only way the items in the resource may be found in One Search is by first adding them to the catalog.
2. The resource is comprised of ebooks which the library owns or to which we have stable, perpetual access. Ebook demand-driven acquisition (DDA) plans may also be considered for loading into the catalog.
3. The resource is used primarily by a community of users who have indicated that the catalog better suits their research needs.

The Discovery Advisory Board accepted this recommendation with the caveat that case by case decisions may be required in some circumstances. This list of exceptions is also a living document that can be changed or added to as needed.

Addressing the growing database

We attempted to apply this new approach retroactively to remove some sets of electronic resource records from the catalog and reduce the size of the database. A similar "eresource record purge" at the University of Dallas is described by Hathaway et al. (2024). While we did not wish to go as far as the University of Dallas, which removed all records except "print monographs, physical media, and purchased ebooks for which the library has permanent retention," we did come to believe a "more siloed approach" might be more beneficial to our users and staff (p. 233). In trying to determine if there were records that we could remove from the catalog, we organized our thoughts by the formats of electronic resources.

Library departments were overwhelmingly in favor of continuing to add ebook records to the library catalog. Their experience had shown that the library catalog was naturally the place users searched for books, and they wanted ebooks to show up alongside print books in search results. The consensus was to leave/add MARC records for ebooks for any package in the library catalog. For Evidence Based Acquisitions (EBA) packages that contained ebooks, we determined that the libraries had been inconsistent, loading records in some cases and not in others. We elected to remove records for unowned EBA titles. Going forward, the libraries will not load records for EBA titles until they are owned by the library.

In contrast to their approach to ebooks, departments approved removing ejournal records, because most journal titles are electronic, and users did not typically search the catalog for those titles. We reasoned that access to ejournal titles would best be offered through the Online Journals and eBooks portal and through One Search, where users could also search for individual articles. Accordingly, we removed 11,500 journal title records, acknowledging that there would still be some ejournals represented in the library catalog because records for journal titles in databases with mixed formats cannot be easily isolated.

We discovered many online primary source collections had rich metadata in the vendor's interface, allowing the items/titles to be discovered in different ways. However, MARC records supplied by the vendor for these materials had a number of weaknesses. They often only contained minimal descriptive metadata, usually just a title and a URL. Titles such as "Serving tray," "Gordon Sill to Aunt Ted," and "Miscellaneous and undated reports" provide very little context in the library catalog and One Search without subject headings or other descriptive terms. Periodicals in these collections usually had a record for each issue of the publication, resulting in hundreds of entries in the library catalog and One Search with nothing more than the publication title, volume number, and issue number in the title entry. Vendor records also often categorize all types of physical items as electronic books, creating more confusion for users. We concluded that access to these collections was best provided via the vendor interface, linked from our A-Z database list, and in One Search. This resulted in a decision to remove approximately 200,000 records from the local catalog.

ECU Libraries have recently been collecting many streaming video packages due to their popularity in classroom instruction. As a study by Wang and Loftis (2020) showed, accessing streaming video content is becoming increasingly important to users as online courses proliferate. Streaming video content is a format that we often receive questions about the best place to look these materials, so it was important to examine more closely how streaming video is represented in our various discovery tools. We reviewed 13 evideo collections for which vendor-supplied MARC records were loaded to the catalog. We wanted to determine if the Summon CDI provided adequate access or if records in the catalog were needed for them. Each of these collections was noted as having index coverage in the CDI. We systematically conducted searches in One Search for 40 to 50 randomly selected titles from each collection. While we found nearly all the titles we searched, by examining the source of each result we determined that in six of the 13 collections, over 20 % of the titles were found in One Search only because the record had been added into the catalog. They were not included in the CDI. We therefore determined that CDI coverage is unacceptably incomplete. Since MARC360 does not provide records for evideo titles, vendor records need to continue to be loaded to the catalog to provide access to these titles in One Search.

Conclusion

The question of how best to provide access to growing electronic collections is one of crucial importance to academic libraries as these resources have already far overtaken traditional library holdings measured by metadata and by budget expenditures. Workflows that have served libraries for years need to be reexamined for libraries to integrate huge amounts of electronic material and stay current with user expectations. After using multiple methods to gather information, ECU Libraries implemented several changes to the navigation and wording of library search tools, redesigned the homepage, removed records from the Symphony database, and most importantly, decided upon a new approach to electronic resources that will better serve users and staff. Certainly, there are deeper changes that should be considered, but we felt the important thing was to begin. We hope these methods can be adapted by libraries and used to assess and evolve the discovery ecosystem to meet the needs of new workflows and the needs of the research community. Surveys of users, collaboration with internal departments, and surveys of other institutions are strategies that can be used to achieve this goal.

Because our survey of libraries was mostly limited to institutions using the same tools (SirsiDynix Symphony and Summon), we are unable to make broad assertions about how academic libraries should address this issue. Nonetheless, the information gathered from various sources showed not only how difficult it is for libraries to design interfaces and tools to serve multiple constituencies, but also how valuable it is to understand different users' needs and how library decisions impact their work. Limitations to our time meant that some constituencies were not included in this phase, most notably teaching faculty. Further study on how teaching faculty search for our resources would offer additional insight into how to improve website design and placement and labeling of discovery tools. At some point, it would be worthwhile to repeat the user study with students to gauge the effect of these changes and whether they have solved the problems identified. The larger question of how best to integrate discovery tools within the discovery environment is one that academic libraries must face to remain relevant in the future.

CRediT authorship contribution statement

Patricia M. Dragon: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Janet L. Mayo:** Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ann Carol Stocks:** Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Rebecca Tatterson:** Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Survey of other libraries

Hi [Name],

I hope this email finds you well. I'm contacting you from East Carolina University (ECU) because we are considering making some changes to which resources are accessible through our Symphony catalog and which are accessible only through our Summon database. I believe [Your Institution] also uses both Symphony and Summon, according to Library Technology Guides (https://librarytechnology.org/)? My colleagues and I would be very grateful if you were willing to respond to a few questions about your deployment of these search tools for users.

We are also preparing an article about this topic, and information that we glean from other institutions could figure into this article, although only in a summary and unidentifiable form.

Here are our questions:

1. Could you characterize what is accessible to users through the Symphony ("[What they call it on their homepage]") and what is accessible through Summon? Is there any overlap? If yes, for what types of resources?
2. How do (or did) you decide what is accessible through Symphony, and what is accessible through Summon?
3. Are there criteria for loading MARC records into the Symphony? For instance, does format play a role? Whether or not you have perpetual access? Whether a resource is purchased or free? Other criteria?
4. Do you load MARC records for electronic resources into your Symphony catalog? Why or why not? If yes, what types of electronic resource records (for example, ebooks, ejournals, streaming audio and video) do you load? All of them or selectively? Why?
5. If applicable, what are your sources for e-resource MARC records? How do you determine which record source you use for your electronic resources?
6. How do you provide access to electronic resources that are not represented in the Central Discovery Index (Summon)?
7. Do library instruction sessions focus more on using the Symphony catalog or the Summon discovery tool? Both equally? Does it depend on the class topic?

Any answers you could provide to these questions would be most helpful and very much appreciated. If you are not the best person to answer these questions, can you please forward this message to the person who is? If it would be easier to talk on the phone, just let us know a good number and time to call.

Appendix B. Student interview assignment

Assignment A

1. Watch the video ***A Slave of Love***. It's available streaming from the library.
2. Read the book ***Essays of Travel*** by Robert Louis Stevenson. It's available as an e-book from the library.
3. Write a research paper on sleep deprivation in students. You must cite 3 journal articles.

Appendix C. Notetaker form for student interviews

Date/Time: _____ Interviewer Initials: ____
Student status: freshman sophomore junior senior ot her_____
Question Sheet: A B C D
Question #1:
__Summon
__[Library catalog]
__Other: _____
Located Item: Yes No
Notes:
****
****
Question #2:
__Summon
__[Library catalog]
__Other: _____
Located Item: Yes No
Notes:

****
****
Question #3:
__Summon
__[Library catalog]
__Other: _____
Located Item: Yes No
Notes:

Appendix D. Questions from meetings with library departments

1. Give them a 5 minute version of our forum presentation, being sure to hit on why we're doing this, the ways the research participants often went wrong, how One Search was used overwhelmingly, and the "food for thought" sections.
2. Do our findings reinforce their observations?
3. In their experience, do users understand the difference between the library catalog and One Search?
4. What do they (staff) use the library catalog, specifically, for? Teaching? Particular job duties?
5. Why do they (staff) turn to the library catalog, specifically, for those tasks? Something about their subject matter? Certain functionality?

6. If we were to pull records out of the library catalog for electronic resources that can be accessed directly through One Search (most electronic journals, videos, books), how would that impact them?
7. Would it be problematic, for instance, if the electronic and print versions of a book were not found side by side in the library catalog?
8. What work would be created for them by this change in philosophy? Would they have to overhaul teaching methods? Change libguides? Change department documentation? Train staff?
9. What other ideas do you have for improving some of the problems mentioned in our presentation (for instance not knowing where to start, not knowing what database to use from the A-Z list, going to e-textbooks for all e-books, getting zero results and giving up, navigating the homepage…)

Data availability

Data will be made available on request.

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