EDITORIAL

Showing Our Resolve

Michael Fernandez and Rachel E. Scott

New Year's resolutions tend to be ephemeral things, conceived in the waking fog of the early morning (or afternoon, no judgment) on January 1 and usually abandoned before the first bloom of spring. Here at *Library Resources & Technical Services (LRTS)*, we strive not to be fair weather planners, and so our resolution for 2025 (and beyond) has been years in the making. The editors of *LRTS*, working alongside Core Journal editors and within the broader family of American Library Association (ALA) publications, resolves to work transparently and in line with best practices for publishing ethics. Beginning in 2022, editors representing journals and magazines throughout ALA's portfolio worked as the Publishing Sub-Committee—Ethics to draft a policy that would facilitate our membership in the Committee on Publication Ethics (COPE). ALA CD#32.2 was approved as ALA policy at the 2024 Annual Conference and awaits placement into the Policy Manual. It will be included in the revised Policy Manual (located in *Chapter 16 ALA Publications* in 2025). In other words, *LRTS* is making great progress on our resolution to work as transparently and ethically as possible.

Running parallel to this process was the drafting of two specific policies. The Core Journal editors, working collectively, wrote policies related to AI/LLM and Post-Publication Concerns. These have now been reviewed by the Core Publication Coordinating Committee and are posted on our respective journal homepages. Authors considering submitting their work to *LRTS* and reviewers who have accepted an assignment should please review the "Use of Generative AI by Authors and Reviewers" policy at https://journals.ala.org/index.php/lrts/about/submissions#authorGuidelines.

Work on the Publishing Sub-Committee—Ethics prompted rich conversations about policy versus best practices. The sub-committee members agreed, for example, that although adopting NISO's Contributor Role Taxonomy (CRediT) is a best practice, it also presents some infrastructural, educational, and labor challenges. Accordingly, it is recommended as a best practice and will be optional for *LRTS* contributors–beginning in this very issue! *LRTS* is excited about these strides supporting ethics and transparency and remains committed to them in the years to follow, unlike that gym membership.

Communications on Practice

The editors invited Drs. Mohammad Hosseini and Kristi Holmes to introduce readers to CRediT, given their deep involvement with the taxonomy. The authors provide important background and context for the support of this practice among ALA journals. The authors helpfully employ CRediT to account for their contributions to the piece.

Michael Fernandez (fernm@bu.edu) is the Head of Technical Services at Boston University Libraries, https://orcid.org/0000-0001-7912-7036. **Rachel E. Scott** (rescot2@ilstu.edu) is the Associate Dean for Information Assets at Illinois State University, https://orcid.org/0000-0001-5847-3378.

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Features

In "Boosting the Identifier Ecosystem of the University of Colorado Boulder Faculty," Chris Long explains the crucial role of unique author identifiers in scholarly communication, both at the individual and campus levels. Long makes the case for the involvement of academic library catalogers in ensuring a robust identifier profile for campus faculty and contributing to the broader identifier ecosystem and its infrastructure.

A large team from Cornell University Library—Kizer S. Walker, Gabriela Castro Gessner, Adam Chandler, Caitlin Finlay, Elizabeth Hines, Susan Kendrick, Jesse Koennecke, Leah McEwen, Jacob Sayward, and Henrik Spoon—reports on their multimodal study "Math and Aftermath: Impacts of Unbundling a Large Journal Package on Researcher Perceptions and Behavior." The team investigated several facets of cost, use, fulfillment, and perceptions surrounding a shift from a large journals package to a selective list of à la carte subscriptions. Qualitative data from interviews provides insights into researchers' strategies for accessing journal articles and relationships between library subscriptions and researchers' publishing behavior.

Eugene Baah Yeboah, Maned A. Mhlongo, and Omwoyo Bosire Onyancha report on a survey and interviews conducted to investigate "Resource Description and Access (RDA) in the Ghanaian Cataloguing Community: Awareness, Competencies and Implications." The findings highlight the difference between awareness, which is high among cataloging practitioners in Ghana, and knowledge and mastery of the RDA guidelines and application of the standard, which was found to be basic. The authors posit that that awareness of the RDA standard will not lead to widespread adoption and implementation and propose strategies to promote teaching and implementation of the standard.

Notes on Operations

"Assessing Opt-In Rates for Transformative Agreements" leverages two pilot open access publishing agreements at the University of Illinois to investigate opt-in rates by each publisher as well as by disciplinary affiliation and rank of the researchers. Daniel G. Tracy, Elizabeth A. Budd, and Thomas H. Teper reflect on the lessons they learned from these pilot agreements and consider the relative benefits and challenges of transformative agreements.

Shari Laster, Lorrie McAllister, Emily Pattni, and Tammy Dang share novel approaches to engaging the Arizona State University community with print materials in "Experimental Approaches to Transforming Academic Library Print Collections." Grant funding and a major renovation spurred the authors creation of eight experimental projects that explored users' engagement with print books. The results highlight community-focused approaches to curating, maintaining, and engaging users with academic library print collections, inspiring readers to create new knowledge and fostering their sense of belonging.

Book Reviews

Books reviewed include *Curating Community Collections: A Holistic Approach to Diverse Collection Development* by Mary Schreiber and Wendy K. Bartlett; and *Inclusive Cataloging: Histories, Context, and Reparative Approaches* edited by Amber Billey, Elizabeth Nelson, and Rebecca Uhl.

The Road Ahead

ALA Publishing Committee Recommends CRediT as a Best Practice

Mohammad Hosseini and Kristi Holmes

Contributions to scholarly work are mostly recognized by means of assigning authorship credit, which can later be used in academic evaluations and for career progression. Sociologists of science describe authorship as a *commodity* that is bartered among scholarly contributors as well as with resources such as research samples.[1] On the flip side, authorship also functions as a mechanism for holding contributors responsible for their work.[2] Despite its significance as means of attributing credit and responsibilities, when beginning a collaboration, researchers might feel uneasy about discussing authorship—specifically, who will be an author and in what order—or about openly communicating expectations regarding commitments and extent of contributions that ultimately determine authorship. These challenges are particularly more pronounced for junior researchers who are inexperienced in authorship negotiations and are at an inherent disadvantage in terms of power disparity with more senior researchers.[3] Consequently, tensions and disagreements may arise and provide the impetus for discussions about authorship, but this is often too late and is more likely to be emotionally charged.

One can reasonably conclude that a proactive approach along with early conversations are more likely to yield ethical attribution of credit and responsibilities.[4] Indeed, best practices for ethical authorship suggest early discussions and frequent follow ups. Nevertheless, frequent disputes and misattributions suggest that this advice is not always followed.[5] One reason why authorship is not discussed early and frequently might be that context-specific discussions about methods or expected results are considered more urgent. For example, in a conversation about design or data collection strategies, it may appear awkward to shift the focus to authorship or set conditions and note something along the lines of "I'll only collect or analyze data if I get a first authorship position." Furthermore, in cases when early discussions of authorship are not properly managed, they could get in the way of doing the actual work by having team members' emotions bruised, erode their trust and good faith in each other, or cause distractions. All of these could compromise the quality of the work and collaboration dynamics, making the team prefer to delay conversations about authorship.

What may exacerbate these human/social factors is the lack of appropriate tools and frameworks to *discuss* authorship as opposed to *assign* authorship. In debates about the ethics of authorship, definitions of authorship are sometimes seen as a panacea, with some believing that if all researchers

Mohammad Hosseini (mohammad.hosseini@northwestern.edu), Assistant Professor, Department of Preventive Medicine and Galter Health Sciences Library and Learning Center, Northwestern University Feinberg School of Medicine, https://orcid.org/0000-0002-2385-985X.
Kristi Holmes (kristi.holmes@northwestern.edu), Director, Galter Health Sciences Library and Learning Center; Associate Dean for Knowledge Management and Strategy; Professor of Preventive Medicine; and Director of Informatics and Data Science, Northwestern University Clinical and Translational Sciences Institute (NUCATS); Northwestern University Feinberg School of Medicine, https://orcid.org/0000-0001-8420-5254.

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know what constitutes authorship and learn how to apply it, disputes and tensions will disappear.[6] Nevertheless, the plurality of definitions with different requirements, context specific challenges related to the meaning of "significant/substantial contribution," and obscurity related to the notions of intellectual versus technical contributions, constrain the effectiveness of authorship definitions.[7] Furthermore, authorship definitions are a means of demarcation—only specifying who is an author—and cannot always facilitate *discussions* about authorship. These challenges have been known for a long time, and various suggestions have been proposed to address them. Among suggested solutions, one pertains to articulation of individual contributions, and a move to *contributorship* instead of authorship. Advocacy for this idea started in the 1990s when experts suggested that scholarly manuscripts should clarify who did what.[8] This idea later evolved and morphed into a more systematic and machine-readable solution called contributor roles: Standard vocabularies to describe what each researcher did in relation to a publication.[9] Thus far, the Contributor Role Taxonomy (CRediT) is the most widely used contributor role schema.

While contributor roles like CRediT are not designed to specify who should be an author, and are used in parallel with authorship bylines, they can alleviate tensions of authorship attribution by enabling teams to discuss specific and standard contributions. In the context of early conversations around authorship, using contributor roles allows teams to discuss and document specific tasks instead of and/or in addition to authorship. As will be mentioned shortly, specific tools that complement contributor roles have been developed for this purpose and can play a significant role in facilitating dialogue and keeping track of conducted and expected contributions.

Contributor Role Taxonomy (CRediT)

In 2012, a group of researchers explored and synthesized contributions that were described in scholarly papers, and subsequently compiled a standard list to describe individual contributions to publications. This list of roles included a unique definition for each role and was called CRediT. Released in 2014, CRediT has fourteen roles including conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing (original draft preparation), writing (review and editing), visualization, supervision, project administration, and funding acquisition.[10] Since CRediT's introduction, it has been adopted by hundreds of journals, and has been formalized as a standard by the National Information Standards Organization.[11] Although CRediT was not developed to address authorship disputes, because it provides a framework to describe contributions in a transparent and user-friendly manner, it facilitates a consistent and systematic documentation of contributions.[12] Complementary tools such as the web-based application and R package called "Tenzing" also facilitate this process when the work is being planned and caried out.[13]

Librarians, Libraries, Authorship, and Contributor Roles

Librarians are frequently involved in collaborative research projects as co-authors, including systematic or scoping reviews or studies that require bibliometric analyses. The specific role conducted by

librarians might vary significantly. A survey (N = 60) conducted by Borrego and Pinfield showed that, when using CRediT roles, librarians describe their contributions to co-authored publications with Writing—review and editing (78 percent), Methodology (63 percent), Investigation (63 percent), Conceptualization (55 percent), and Writing—original draft (50 percent) roles. Other reported roles include Data curation (37 percent), Visualization (33 percent), Formal analysis (28 percent), Project administration (27 percent), Resources (27 percent), Supervision (22 percent), Software (20 percent), Validation (18 percent), and Funding acquisition (8 percent).[14]

Besides co-authorship with researchers, many librarians also publish original research across a wide range of topics, including library management and operations, information literacy, user experience, digital preservation, diversity and inclusion in library services and collections, scholarly communication, data management, collection development, the impact of technology on libraries, and the evolving role of libraries in education and society, to name a few. Accordingly, like many other academic communities, librarians who frequently publish have likely dealt with authorship and its quandaries.

The concept of authorship has historically mattered to libraries and to readers of *Library Resources & Technical Services* for a wide range of technical and social reasons beyond individual authorship, including acquiring, indexing, cataloguing, preserving, and ultimately discovering collections and making them available for use. Due to this specific vantage point, librarians' engagement with authorship and attribution issues is wide-ranging. For example, a librarian may be interested in ensuring that the resource they are ordering is not a duplicate of a resource already owned by the library. Furthermore, through authority control work librarians standardize and maintain information about authors, their works, and subject matter, ensuring organization, consistency, and accuracy in information systems. Beyond the technical and practical aspects of authorship in library systems, there is a social component to the concept of authorship for librarians as they interact with patrons. Libraries work closely with their campus communities to support authors with a range of issues through resources, consultation services, and training on authorship concepts such as ghost authorship, gift authorship, group authorship, and contributor roles, to name a few. For these services, libraries can take advantage of guidelines such as those provided by the International Committee of Medical Journal Editors or the Council of Science Editors.[15]

When it comes to adopting contributor roles, some librarians quickly identified the value of this new concept, because it offers abundant, machine-accessible and interoperable metadata that supports team science through enhancing the recognition of individual contributions.[16] In fact, since librarians have been among under-credited groups in team science, they saw value in acknowledging more specific tasks.[17] Some libraries have leveraged knowledge and experience about scholarly infrastructure, team science, cataloging, and ethics to improve contributor roles in ways that recognize a larger swath of contributions and better convey the concept of contributorship, including work by our team.[18]

Despite librarians' involvement in various team science projects, some of their contributions cannot be captured by widely-used contributor roles such as CRediT.[19] For example, using CRediT one cannot

recognize the role played by librarians who provide educational support or trainings to research teams. It should be noted that this limitation does not only affect librarians and has been raised about roles in other contexts (e.g., community engagement, legal support), which cannot be specifically recognized by CRediT.[20] There may be many more contribution types specific to librarians that are currently not recognized by CRediT, but the only way to identify these would be to have more librarians use CRediT. Indeed, it is by implementing and using contributor roles that other communities have been able to provide suggestions on how to improve the list of roles in contexts such as randomized clinical trials,[21] and software development.[22]

ALA Publishing Committee's Recommendation

As libraries evolve, so does the role of librarians, along with their research and educational endeavors.[23] These changes and transitions necessitate adopting new ways of thinking and embracing innovative strategies to meet the shifting needs of the communities they serve. The decision made by the ALA Publishing Committee to introduce CRediT as a best practice is certainly one step in the right direction and will encourage the library community to use contributor roles, and gain familiarity with this concept. We consider the librarian community's engagement with CRediT as a process, which might involve some trial and error to find the most suitable format and implementation strategy. For example, some journals (e.g., *PLOS One*) have incorporated CRediT into their submission workflow and collect individual contributions as metadata, but others only require/suggest disclosure as a declaration at the end of manuscripts (e.g., *Learned Publishing*). Sometimes specifying contributions using CRediT is mandatory (e.g., in *PLOS One*), but other times it remains at authors' discretion (e.g., in *Learned Publishing*). These nuances will impact the implementation at a journal level in terms of costs and could result in (dis)satisfaction of certain users. Furthermore, some librarians may find specifying contributions in the context of library sciences/management superfluous. This is particularly true for projects or manuscripts with only one or two authors, where a detailed breakdown of individual roles might seem unnecessary and create additional administrative burden. This resistance has existed elsewhere too but looking at non-STEM contexts where contributor roles have been successfully implemented shows that in the long run, an accurate description of roles and contributions results in further specification of tasks and enhances recognition. For example, in digital humanities, the Taxonomy of Digital Research Activities in the Humanities (TaDiRAH) was introduced in 2014 and after being used by the community and receiving feedback, was revised in 2021.[24] It seems likely that CRediT will also evolve to reflect the needs of the community, including roles played by library-based authors.

We commend the American Library Association Publishing Committee for the endorsement of CRediT to better reflect the wide range of contributions necessary for the success of the work that is published in ALA journals.

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FEATURE

Boosting the Identifier Ecosystem of the University of Colorado Boulder Faculty

Chris Evin Long

Unique author identifiers play a crucial role in scholarly communication, enabling the correct attribution of authorship and the promotion and discovery of scholarly works. Identifiers benefit both the individual faculty member and their campus community as well. Academic library catalogers play an essential role in ensuring a robust identifier profile for the faculty on their campus and in growing and maintaining the broader identifier ecosystem. This study provides the most thorough analysis to date of the faculty identifier ecosystem of an R1 public university, examining the prevalence of five identifiers among the university's faculty and using this information to determine practical ways that its cataloging team can boost the local and global identifier ecosystem, as well as providing guidance to other cataloging agencies interested in a similar endeavor.

The expansion of catalogers' involvement in name authority control systems beyond creating Name Authority Cooperative Program (NACO) records can be seen as a natural evolutionary step, but in general they have ventured into this ecosystem without a comprehensive understanding of the landscape. Previous researchers have examined the prevalence of faculty identifiers, but their studies have either involved a limited number of faculty or academic disciplines, or they did not investigate the Wikidata database. This lack of guidance leaves cataloging managers in a quandary. Although there is certainly merit in experimenting with non-NACO endeavors like International Standard Name Identifier (ISNI) records and Wikidata items, it is unclear how best to assess the benefits and challenges of incorporating new efforts into workflows and determine which identifier programs provide the best value. This paper expands on previous research by offering the most thorough analysis to date of the faculty identifier ecosystem of an R1 public university, the University of Colorado Boulder (CU Boulder). The study includes all CU Boulder personnel designated as faculty in the 2019/2020 academic year and, for each person, examines the existence of researcher identifiers from the Library of Congress Name Authority File (LCNAF), the OCLC-hosted Virtual International Authority File (VIAF), ISNI, Wikidata, and Open Researcher and Contributor ID (ORCID) databases. The reasons for selecting these five identifier systems are explained later in the article. The study also breaks down the data by both the faculty member's academic rank and primary academic unit. In addition to providing insight into CU Boulder faculty's current identifier environment, the information will be used to consider how best CU Boulder's catalogers can channel their identifier creation efforts into non-NACO activities. This approach will provide guidance for other cataloging agencies seeking practical ways to make meaningful contributions to the local or global identifier ecosystem.

Chris Evin Long (chris.long@colorado.edu), Professor and Faculty Director of Resource Description Services, University of Colorado Boulder University Libraries, https://orcid.org/0000-0003-3953-7940.

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Background

Catalogers in the Program for Cooperative Cataloging (PCC) community have been encouraged in recent years to move their traditional authority control work of creating name authority records (NARs) for the NACO Program toward an identity management model. This aspiration was first expressed in the PCC's 2015 strategic planning document *Vision, Mission, and Strategic Directions: January 2015–December 2017*. A pivotal emphasis of this transition involved shifting the PCC's authority control practices from "an approach based on creating text strings to one focused on managing identities and entities. . . . This string-based approach works somewhat well in the closed environment of a traditional library catalog, but not in an open environment where data are shared and linked, and so require unique identifiers."[1] To implement this new direction, the PCC established a partnership with the International Standard Name Identifier International Agency (ISNI-IA) and initiated the PCC ISNI Pilot that allowed its members to engage in identity management activities within the ISNI database.[2] Twelve US academic libraries participated in the project from 2017 to 2018, creating and revising ISNI identifiers for individuals and organizations. This project was deemed a milestone event for the community since it was "the first initiative that enabled the PCC to explore a new path for creating internationally recognized identifiers for individuals and organizations outside of the PCC NACO program."[3]

On the heels of the successful ISNI trial, the PCC's 2018 strategic plan sought to accelerate the pace of change from authority control to identity management. Strategic Direction 3 (SD3) encouraged members to apply their understanding of linked data, and Strategic Direction 4 (SD4) called for an acceleration of ubiquitous identifier creation and identity management. These strategic directions signaled a shift in focus from experimentation to implementation, envisioning "an environment where identity management work activity is characterized by much greater proportions and numbers of entities receiving identifiers."[4] The PCC's first step in meeting SD3 was the URIs in MARC Pilot, launched in 2019. Pilot participations increased the linkability of both authority and bibliographic records by adding identifiers in MARC 024 fields, including Real World Objects (RWO), Uniform Resource Identifiers (URIs), and conventional library identifiers from traditional and nontraditional sources. The PCC's next pilot project addressed SD4, which specifically mentioned Wikidata as a potential strategic partner.[5] Recognizing Wikidata's value as a high-demand identifier hub, the PCC saw engagement with it as another opportunity for catalogers to implement identity management principles while also lowering the barrier for authority creation and maintenance, and commenced the PCC Wikidata Pilot in 2020.[6] Whereas participants for the first two pilots were drawn mostly from PCC institutions or partner communities, the Wikidata pilot was much larger and more diverse, with over seventy participating institutions that included several non-US and non-PCC organizations. At the time of this writing, over 52,000 Wikidata items had been created and over 162,000 Wikidata revisions had been made by pilot participants.[7] The PCC's current strategic plan seeks to further build on both of these pilot projects, calling for "broader PCC member participation in ISNI, Wikidata, and similar emerging Linked Data-based ventures, as activities that form a part of a holistic, reimagined standard cataloging workflow."[8]

Catalogers' Role in the Identifier Ecosystem

A common element of these PCC pilot projects was the ability of participants to determine their own goals and areas of concentration. Given the sizable proportion of academic library contributors, it is not surprising that several focused their efforts on working with the identifiers of their institutions' faculty and academic units.[9] In utilizing their identifier creation skills, catalogers play an essential role in strengthening their campus identifier ecosystem—the complex network of unique, persistent identifiers that exists in the scholarly communication universe—thereby providing crucial value to both scholars and their institutions. Faculty benefit from having a clear scholarly identity that is linked to a robust identifier profile. Rotenberg and Kushmerick note, "This ever-expanding universe of scholarship requires tools and services to enable proper attribution of contributions to the correct individual."[10] The proper attribution of scholarly output is critical to a faculty member's career and reputation and is essential to achieving tenure and promotion. Obtaining unique identifiers early in a researcher's career is especially important. As Smith-Yoshimura et al. state, "The earlier in the career an ID is used in association with a researcher's scholarly output, the less likely misattribution will occur—especially for common names—and the more likely the scholarly output associated with a researcher will be comprehensive and accurate."[11] Accurate attribution also assists universities in their efforts to track and report on faculty and graduate students' scholarly work, demonstrating institutional research productivity to governing bodies and enhancing the organization's academic reputation.

Cataloger intervention is essential to growing and maintaining the identifier ecosystem in a broader sphere, not just at the campus level. Three of the databases studied in this article are formed, some directly and others indirectly, by the labor of catalogers: LCNAF, VIAF, and ISNI. LCNAF is built and sustained solely by catalogers' authority control expertise and VIAF clusters are largely constructed by ingesting authority files from national libraries. VIAF was the base file used to populate ISNI's initial database, and PCC catalogers can now contribute directly to ISNI through the PCC's status as a registration agency. A growing number of catalogers have entered the vast community of Wikidata editors and are creating and enhancing items in the Wikidata repository. Moreover, although ORCID identifiers are self-claimed by faculty, catalogers can play the role of advocates or trainers on campus by raising awareness of the importance of unique author identifiers.[12] In addition to creating and promoting the use of identifiers, catalogers play an important role in connecting or embedding them as links to other identifiers in records they create and revise. This work advances the PCC's strategic action item: "URI-based linkages between data sources traditionally focused on by the PCC and other data sources where we want strategic connections."[13]

Literature Review

The value and use of unique author identifiers and the systems that promulgate them have been frequent topics in the library science literature for more than a decade. Articles on the impact that author identifiers have on the correct attribution of authorship and promotion and discovery of faculty scholarship abound. Also plentiful are articles examining the major identifier systems like ORCID,

ISNI, VIAF, and LCNAF, including how identifiers are minted and clustered, and the ways in which the systems interact with each other. A subgroup of this literature, discussed below, intersects with the foci of this article, namely the prevalence of various author identifiers among university faculty and the types of identifiers that are more common among faculty in particular academic disciplines. The discoveries of the prevalence and disciplinary distribution of faculty identifiers observed in previous research are briefly noted here but will be correlated in greater detail with the results of this study in the Results and Discussion section.

Panigabutra-Roberts conducted the only study thus far whose stated purpose was to analyze the prevalence of author identifiers among a set of faculty members, that of the American University in Cairo (AUC). In addition to investigating how fifty-five (out of a total of 491) randomly selected AUC faculty distributed and shared their creative work, she also examined how frequently their names were identified in LCNAF, VIAF, ISNI, Google Scholar, and ResearchGate. She counted the number of faculty members having each type of identifier, and her convenience sample included scholars from various disciplines, including arts, humanities, social science, science and engineering, business, and global studies. Panigabutra-Roberts concluded that researchers "tend to have scattered identities and publication profiles" and emphasized the challenge of maintaining and crosslinking multiple identities for researchers.[14]

Other authors have also noted the prevalence and disciplinary distribution of faculty identifiers as incidental observations, but not as the primary focus of their research. Separate articles by Mering and Downey in 2019 explored ways to implement identity management practices in the institutional repositories (IRs) of their respective universities. Mering addressed the challenge of consistently and accurately identifying contributors in the University of Nebraska-Lincoln's (UNL) IR and associating them with their scholarly works. Part of her study examined the prevalence of VIAF and ORCID identifiers for 114 tenured and pre-tenured faculty in four departments at UNL—food sciences, history, physics, and child, youth, and family studies—and noted some sharp contrasts among the disciplines, especially between history and physics.[15] Downey investigated the VIAF, LCNAF, and ORCID identifiers associated with a random sample of 290 unique name strings in Duke University's IR to identify a suitable source of author URIs. Her sample comprised mainly of Duke faculty whose specialties encompassed the humanities, social sciences, sciences, and medicine, and she discovered that although there was considerable disparity in the frequency of ORCID identifiers between faculty in applied sciences and those in the humanities and social sciences, the disciplinary distribution in the VIAF and LCNAF databases was much more even.[16] Sandberg and Jin explored methods of providing authority control for journal article authors by linking to external international authority databases, specifically VIAF, ISNI, ORCID, and Scopus. Their study concentrated only on music, library science, and computer science scholars, but they noted differences in the frequency of particular identifiers for faculty in certain fields.[17] Waugh, Tarver, and Phillips sought to develop and evaluate a workflow for establishing name authorities in the University of North Texas's electronic thesis and dissertation (ETD) collection. They recorded the frequency of VIAF and LCNAF identifiers in a random sample of 200 names in the ETD collection but did not take note of the disciplines.[18]

In addition to the studies that directly or indirectly considered the prevalence of author identifiers, two 2017 studies queried faculty members' awareness and use of their own unique identifiers. Tran and Lyon reported the survey findings of 300 Stonybrook University faculty respondents from a variety of disciplines, including the sciences and the arts and humanities. Of the identifiers studied—ORCID, Scopus, ResearcherID, arXivID, Google Scholar, and PubMed—ORCID had the highest level of awareness.[19] In another survey, the Primary Research Group asked faculty from 325 major research universities in the United States, the United Kingdom, Ireland, Canada, and Australia if they had ORCID and ISNI identifiers. The respondents represented a comprehensive array of subject areas and, unlike other studies in this review, the results were broken down by tenure status. However, the responses included large numbers of "No Answer" and indicated a lack of awareness of ORCID and ISNI identifiers.[20]

In summary, prior research has largely concentrated on either small groups of scholars, limited types of author identifiers, or contributors (sometimes non-faculty) to local storehouses of scholarship such as IRs and ETD collections. Furthermore, the studies examining the incidence of identifiers by academic discipline have looked at a limited number of subject areas and ignored academic rank.

Institutional Context

Founded in 1876, CU Boulder is classified as an R1 institution and is one of only thirty-five US public research institutions belonging to the Association of American Universities (AAU). Fall 2022 student enrollment was 36,430, and the campus has 1,300 tenured and tenure-track faculty.[21] CU Boulder offers courses in approximately 160 distinct fields of study and 235 degree programs across the baccalaureate, master's, doctoral, and professional levels. Its eleven colleges and schools encompass a full range of academic disciplines in the humanities; social sciences; physical and biological sciences; engineering and applied sciences; fine and performing arts; education; media, communication, and information; environmental design; business; and law. The size and disciplinary diversity of the CU Boulder campus thus allowed for a comprehensive examination of its faculty's identifier ecosystem. The University Libraries at CU Boulder has five library locations and houses the largest collection in the Rocky Mountain region, surpassing 15 million volumes. The primary cataloging unit within the University Libraries is the Resource Description Services (RDS) Team, which has been a long-standing contributor to all PCC programs. However, in recent years RDS has experienced several departures of key personnel and the current staff of thirteen FTE includes only three remaining PCC-trained catalogers, reduced from nine just three years ago.

Selection of Identifiers Studied

There are many identifier systems that could have been included in this study, but only five were selected: LCNAF, VIAF, ISNI, Wikidata, and ORCID. The rationale for focusing on these identifiers was based on both their utilization in current library linked data initiatives and the University Libraries' ability to bolster that utilization by actively contributing to and improving these databases. For

instance, LCNAF, VIAF, ISNI, and Wikidata identifiers are being used to enrich metadata in emerging linked data production systems like Share-VDE. This enrichment increases the discovery potential of library resources, facilitates information exchange, and enhances the authoritativeness of library data.[22] Similarly, the Linked Data for Production: Closing the Loop (LD4P3) grant aims to create a working model of a complete cycle for linked data creation, sharing, and reuse. As part of this project, Cornell University is experimenting with a process that uses linkages between LCNAF and Wikidata identifiers to add contextual information about authors and subjects to enhance discovery in their library catalog.[23]

Identifiers must be created before they can be used, and RDS catalogers have experience working with all identifier systems in this study. PCC-trained catalogers at CU Boulder usually have contributed several hundred NACO authority records to the LCNAF annually. NACO records created by RDS catalogers are ingested monthly into VIAF, where they are matched and clustered with authority files from more than forty national libraries, cultural agencies, and other organizations, and then assigned a VIAF identifier.

RDS catalogers have also engaged with the broader identifier ecosystem. A sample of 200 NACO records for CU Boulder faculty were enhanced with VIAF, ISNI, ORCID, and Wikidata identifiers as part of the PCC URIs in the MARC Pilot. Several team members also participated in the PCC ISNI Pilot, which afforded them the chance to experiment with identity management practices outside the traditional authority control realm. The ISNI database is populated from a diverse set of data sources, including libraries, rights management societies, researchers' databases, and the music industry. Consequently, its database includes artists, performers, inventors, visual creators, producers, publishers, and aggregators in addition to researchers and writers.[24] In partnership with CU Boulder's Office of Faculty Affairs (OFA), RDS staff created or modified ISNI records approximately for 250 faculty and twenty-five academic units in the College of Engineering and Applied Science. The purpose behind the team's participation was not only to provide new expertise to its catalogers, but also to assist OFA's efforts to harvest campus research productivity by building a more robust identifier environment for CU Boulder faculty.

CU Boulder catalogers next ventured further into the linked data sphere by participating in the PCC Wikidata Pilot in 2020. Wikidata is a knowledge base that contains the structured metadata that underpins all the various Wikimedia projects, the most familiar of which is Wikipedia.[25] CU Boulder's pilot project involved monographs by a group of women poets in its Women Poets of the Romantic Period and Santa Clara University's Stainforth Library of Women's Writing digital collections. This pilot became a convergence of all our catalogers' various identifier expertise, involving the creation or revision of NACO records, the attendant VIAF clusters, ISNI records, and Wikidata items, to which the other identifiers were added. Not only did this project provide an opportunity for our catalogers to build new linked data skills, but also to create a more robust bibliographic identity and Semantic Web presence that was sorely lacking for some of the women poets.[26]

ORCID identifiers, although not minted by CU Boulder catalogers, were included in the study because of their importance in campus efforts to harvest CU Boulder faculty's research productivity. The ORCID

registry allows scholars to self-claim identifiers by creating and maintaining a permanent, portable profile that can be linked to their scholarly works and grants.[27] In 2014 and again in 2016, CU Boulder proactively created ORCID identifiers for all current faculty and since then has strongly encouraged newer faculty to self-register, emphasizing the benefits of accurate attribution, increased researcher visibility, and enhanced academic reputation.[28] In fact, using ORCID to auto-claim publications has become an integral component of CU Boulder Elements (CUBE), which is used in the annual faculty reporting process to describe the contributions and scholarly impact of the CU Boulder campus faculty.

Interlinking Among Identifier Systems

Interlinks to related information among Semantic Web (SW) linked data datasets is a fundamental component of the SW and expands the knowledge of the relationship among resources within the datasets. Interlinks among identifier systems such as those in this study can be used to establish that an entity in one dataset is the same as an entity in another and therefore improve its discoverability.[29] Catalogers can therefore boost a person's SW profile by enriching their identifier records with links to other identifiers.

However, there are a considerable number of reciprocal links already embedded in LCNAF, VIAF, ISNI, and Wikidata identifiers and they are deposited there in a variety of ways. In the case of VIAF, an OCLC service, this occurs because it receives data periodically from the LCNAF, ISNI, and Wikidata databases. VIAF has two categories of membership—data contributors (agencies that formally join VIAF, including the Library of Congress (LC)) and data providers (selected data sources that are not VIAF contributor agencies, including ISNI and Wikidata).[30] VIAF receives all of LC's authority records in the LCNAF, as well as its MARC-formatted bibliographic records. The non-unique name authority records in the LCNAF are provided but are not loaded into VIAF.[31] VIAF also receives data from ISNI and Wikidata, although their data are used selectively because they are data providers, not contributors. As part of these processes, LCNAF, ISNI, and Wikidata identifiers are added to VIAF clusters. There is no set schedule for the data exchanges between VIAF and the ISNI, Wikidata, and LCNAF databases; VIAF relies on contributors notifying OCLC when updates are available.[32] Research by Bianchini, Bargioni, and Pellizzari di San Girolamo provides insight into how prevalent LCNAF, ISNI, and Wikidata identifiers are in VIAF personal name clusters. Thirty-eight percent of VIAF clusters contained an ISNI identifier and LCNAF and Wikidata identifiers were present in 33 percent and 10 percent respectively.[33]

In the case of ISNI, there are no comprehensive data exchanges between it and the VIAF, LCNAF, and Wikidata databases, although these identifiers are often embedded in ISNI records. Some of this interlinking is the result of past exchanges. ISNI used VIAF data as its base cross-domain file for populating the initial ISNI database, and until 2016 there was an identifier linkage process. However, this process was discontinued around 2016 when the VIAF clustering process was judged to be too volatile for it to be used as a reliable feed into ISNI. Nevertheless, ISNI still selectively uses VIAF data for correction and enrichment, and it adds appropriate VIAF identifiers to its records. There was a one-time multimillion record load of data from LCNAF into ISNI around April of 2021, but that exercise has

not been repeated since.[34] The initial ISNI database also included loads from non-library partners like ProQuest, which contributed millions of identities from its portfolio of databases.[35]

LCNAF records contain links to VIAF, ISNI, and Wikidata sources. The one-to-one relationship between the LCNAF and VIAF (with a few exceptions for undifferentiated names) enables a search between the two systems that populates the LCNAF record with the VIAF identifier. Links in LCNAF records to ISNI identifiers are only present because they were inserted into the NACO record by individual catalogers.[36] The Library of Congress (LC) recently announced a collaborative creation "with the Cornell University Library of a Wikidata bot (LccnBot) to facilitate creating connections between the LCNAF and Wikidata. The bot adds the LC control number (LCCN) from a name authority to Wikidata when the authority record contains a Wikidata identifier in the MARC 024 or 670 fields. This eliminates the need to return to the Wikidata item to add the LC identifier after a name authority record has been created. . . . The bot runs weekday mornings to ensure timely updates to Wikidata."[37]

Wikidata is still very far from having a structured workflow to ingest data from other data sources. Wikidata items can house many identifiers from other identifier systems, but they are only input through the voluntary work of Wikidata users. When examining Wikidata items, Bianchini, Bargioni, and Pellizzari di San Girolamo found a notable connection with VIAF; almost 25 percent of the items included a VIAF ID. Furthermore, they noted that almost all Wikidata items that include a VIAF identifier also have at least one VIAF source ID (e.g., LCNAF or ISNI). VIAF IDs are automatically sorted as the first external identifier in Wikidata items, but there is no automatic reciprocity between VIAF and Wikidata, i.e., when one system gets a link to the other, the latter system does not automatically get a link to the former.[38]

The ORCID system is the one least connected with the other four. Its closest connection is with ISNI, which has reserved a block of its IDs for ORCID's use. In spite of there being a tool, ISN2ORCID, that allows ORCID registrants to import their ISNI information into their ORCID profile, it is unclear how frequently this is done or how prevalent ISNI identifiers are in ORCID records. ORCID identifiers are also present in LCNAF records and Wikidata items, but only because individual contributors have input them. ORCID is not a participant in VIAF.

Academic Disciplinary Aspects of Identifier Systems

Previous research has indicated that authors from certain academic disciplines or those who mainly publish in certain types of publications are better represented in some identifier systems than others. For instance, the VIAF and LCNAF databases are built from library authority files and primarily represent authors of monographs.[39] This means that faculty in the arts, humanities, and social sciences, fields in which books have great reputational value, will have more representation in VIAF and the LCNAF than scholars in other disciplines.[40] Even though they are close cousins, there are also some disciplinary distinctions between VIAF and the LCNAF. Engineering faculty, for instance, are not well-represented in the LCNAF but have a greater presence in VIAF because it includes more conference proceedings.[41]

The monograph-centric nature of both LCNAF and VIAF, however, can omit authors who chiefly produce journal articles. Therefore, in disciplines like engineering, the hard sciences, and law, where journal articles are a highly valued vehicle for disseminating scholarship, some prominent researchers will not have authority records in VIAF and the LCNAF.[42] The disciplinary gap left by authority hubs like VIAF and LCNAF is filled in part by identifier registries such as the ISNI and ORCID databases. Like VIAF and LCNAF, the ISNI database includes book and conference paper authors, but it also aggregates identities of journal article authors from data providers like ProQuest and Scholar Universe. Furthermore, it creates identifiers for artists, producers, and performers, thereby including faculty whose scholarship is non-textual.[43] ORCID also encourages the registration of scholars who publish journal articles, papers, datasets, and software.[44] Although ORCID does not store data about the types of publications included in it, it is possible that journal articles are the predominant type. This would explain Dasler et al.'s observation that the representation of ORCID identifiers within the natural, health, and applied sciences is higher than in fields of the arts, humanities, economics, and social sciences.[45] It would also validate Webster's suggestion that the ORCID database has a potential bias against scholarship within the humanities, which is generally published as monographs rather than journal articles.[46]

Research Design and Methods

Faculty data for Academic Year (AY) 2019/2020 obtained from CU Boulder's OFA included 2,201 persons. The dataset contained names, academic ranks, academic appointments to colleges and schools, and links to the faculty member's online campus profile. CU Boulder has numerous academic ranks, and faculty members were assigned to one of six categories: tenured and tenure-track, non-tenure track, administrative, research, clinical, and other. For faculty with multiple ranks, their CU Boulder faculty profile was consulted to determine their primary job duties and they were assigned to the most relevant rank. Some academic ranks include several classes of faculty titles. The tenure and tenure-track category includes professors of all levels (i.e., assistant, associate, full, distinguished professors, and emeritus/emerita professors). The non-tenure track category contains all instructors, teaching professors, scholars-in-residence, and artists-in-residence. Chairs, faculty directors, deans, chancellors, and provosts were assigned to the administrative faculty group. Clinical instructors and clinical professors made up the clinical faculty category, and the research group contained faculty listed as research professors. The "other" category comprised a mix of other (sometimes temporary) ranks, including lecturers, adjoint/adjunct professors, attendant professors, and visiting professors.

Academic appointment information received from the OFA was used to assign faculty members to one of the units in the university's eleven colleges or schools. Some faculty members held appointments in multiple colleges or schools, but for the purposes of this study, each faculty member was assigned to only one unit based upon the primary appointment designated in the OFA data. Given the size and structure of the College of Arts and Sciences, its faculty were further subdivided by academic division (Arts and Humanities, Natural Sciences, and Social Sciences) and then again by department.

The final step was compiling a list of all existing LCNAF, VIAF, ISNI, ORCID, and Wikidata identifiers for every CU Boulder University faculty member. Columns for each of the four identifiers were added to the faculty dataset spreadsheet received from OFA and, during August and September 2021, every faculty member was manually searched in each database and identifiers were recorded in the appropriate column. Because Neubert's research demonstrated Wikidata's potential as an identifier hub, the presence of LCNAF, VIAF, ISNI, and ORCID identifiers in faculty Wikidata items was also recorded in separate columns.[47] It was often necessary to consult the published works listed in the person's profile page or curriculum vitae to match the person with the proper identifier correctly. Linkages between the identifier systems (e.g., the inclusion of an LCNAF identifier in a Wikidata item or the presence of a Wikidata identifier in a VIAF record) also aided the reconciliation process. Instances of duplicate identifiers were also recorded; although duplication was rare, it was most prevalent for Wikidata and ISNI identifiers. Because the Wikidata and ISNI systems have mechanisms for resolving duplicates, deduplication was done whenever possible.

Results and Discussion

Table 1 shows the breakdown of the 2,201 faculty members by rank. Tenured or tenure-track faculty comprise the largest group (63.3 percent), followed at a considerable distance by non-tenure track faculty (25.7 percent) and administrative, research, clinical, and other faculty (collectively 11 percent). Full professors constitute the largest single cohort of all faculty (n = 612, 27.8 percent), and the overall numbers indicate that most CU Boulder faculty are seasoned researchers in the mature stages of their careers.

Table 1. CU Boulder faculty by academic rank

Academic Rank	**Total Population** (N = 2,201) n (%)
Tenured/Tenure-Track	1,394 (63.3)
Professor	612 (27.8)
Associate Professor	407 (18.5)
Assistant Professor	375 (17)
Non-Tenure Track	566 (25.7)
Instructor/Senior Instructor/Teaching Professor	511 (23.2)
Artist/Scholar in Residence	55 (2.5)
Administrative Faculty	105 (4.8)
Research Faculty	71 (3.2)
Clinical Faculty	15 (0.7)
Other Faculty	50 (2.3)

Table 2 shows the distribution of the 2,025 faculty members (92 percent of total faculty) who held an academic appointment in at least one of CU Boulder's academic units. The College of Arts and Sciences (COAS) was home to the greatest number of faculty (n = 1,040, 51.4 percent), followed by the College of Engineering & Applied Science (CEAS) (n = 375, 18.5 percent). COAS's Natural Sciences division contained the most faculty of any single academic unit (n = 560, 27.7 percent) and combined with CEAS comprised over 45 percent of the total faculty, revealing the campus's strong focus on science. In addition, the substantial number of faculty in such diverse areas as the arts, humanities, social sciences, business, media, music, law, and education demonstrates the comprehensiveness of the university's academic profile.

Table 2. CU Boulder faculty by academic unit

Academic Unit	**Total Population** (N = 2,025) n (%)
College of Arts and Sciences	1,040 (51.4)
Natural Sciences	560 (27.7)
Arts & Humanities	289 (14.3)
Social Sciences	191 (9.4)
College of Engineering & Applied Science	375 (18.5)
Business School	151 (7.5)
College of Media, Communication and Information	99 (4.9)
College of Music	85 (4.2)
Law School	72 (3.6)
School of Education	69 (3.4)
University Libraries	54 (2.7)
Program for Writing and Rhetoric	43 (2.1)
Program in Environmental Design	29 (1.4)
Graduate School	6 (0.3)
Continuing Education and Professional Studies	2 (0.1)

The analysis of the collected data examined three broad areas regarding CU Boulder faculty identifiers: the current state of CU Boulder's identifier ecosystem, including the total number of each identifier, further dissected by academic rank and discipline; the robustness of faculty identifier profiles; and the extent to which Wikidata is serving as an identifier hub for faculty. This section will explain the results in each area and compare them to findings in related studies when appropriate.

Overall Prevalence of Identifiers at CU Boulder

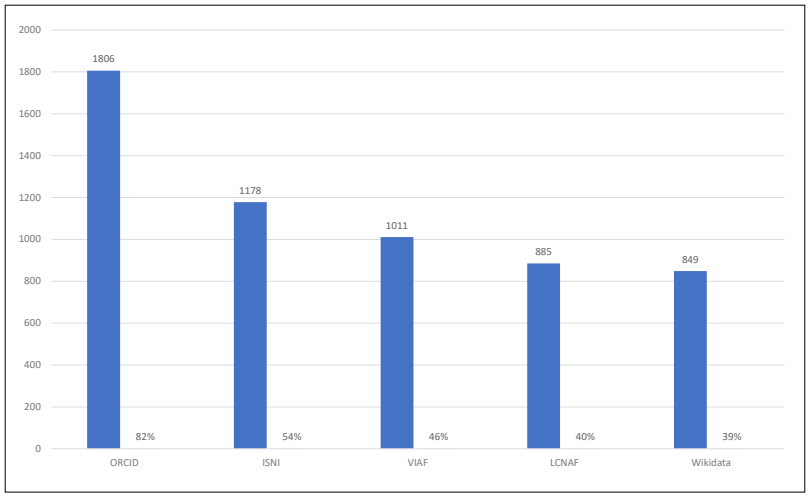

Figure 1. Prevalence of identifiers among CU Boulder faculty (*N* = 2,201)

Figure 1 shows the number of each identifier for all CU Boulder faculty. The most prevalent faculty identifier was the ORCID at 82 percent. ORCID's primacy in the CU Boulder identifier ecosystem was expected given the university's promotion of ORCID registration among its faculty. Given the large number of faculty in engineering, natural sciences, art, music, and law—whose scholarly work is prone to take the form of journal articles, exhibitions, and performances—it is not surprising that the cross-domain ISNI is the second-most common identifier (54 percent). Furthermore, the smaller yet still substantial number of faculty in monograph-centric disciplines like the arts, humanities, and social sciences accounts for the position of VIAF (46 percent) and LCNAF (40 percent) in this order. One might not expect such a large gap between the closely related VIAF and LCNAF systems, but it is likely accounted for by the former's inclusion of conference proceedings, making it therefore more likely to include some of CU Boulder's engineering and science scholars that are excluded from the LCNAF. Despite Wikidata's relatively recent emergence as an identifier system, it was only slightly behind the much more established LCNAF database at 39 percent. This might be explained by Wikidata's broader community of contributors, which extends well beyond the realm of librarians, as well as the utilization of bots—computer programs that can create and revise Wikidata items without direct human intervention.

When comparing these findings to other multidisciplinary identifier analyses, it is useful to note that previous studies were much more limited in terms of both the number of faculty and the academic disciplines represented in them. Nevertheless, an examination is offered for the sake of interest. ORCID identifiers for CU Boulder faculty existed at a much higher rate than those found in studies by Mering (43 percent), the Primary Research Group (35 percent of US faculty), and Downey (19 percent).[48] The prevalence of ISNI identifiers among CU Boulder faculty also shows a much higher percentage than that discovered by Panigabutra-Roberts (38 percent) or reported by respondents to the Primary Research Group's survey (2 percent). A large number of participants in the latter study, however, did not answer the ISNI question, indicating that they may not have known if they had one.[49] On the other hand, the percentage of CU Boulder faculty with VIAF identifiers is below that found by Panigabutra-Roberts (56 percent) and Mering (52 percent), although it is higher than the one found by Downey (23 percent).[50] The percentage of CU Boulder faculty with an LCNAF record was similarly middling when compared to other studies. It is lower than that reported by Ilik (almost half of Texas A&M University faculty) and Panigabutra-Roberts (46 percent) but larger than that found by Waugh, Tarver, and Phillips

(26 percent) and Downey (14 percent).[51] Given the disparities between sample sizes of faculty and disciplines, it is difficult to draw any firm conclusions from these comparisons.

Prevalence of Identifiers by Academic Rank

No prior studies have examined the incidence of author identifiers in connection with academic rank and that was a primary objective of this study. Table 3 shows the results. Tenured or tenure-track faculty account for the largest percentage across all types of identifiers. This should not be surprising given the fact that this group has the highest expectations for research productivity on campus. Full professors are the largest subgroup across all identifier types. This is probably because faculty in more mature stages of their careers will have a more robust scholarly profile and will therefore have accrued many research identifiers. This hypothesis also holds true at the associate professor versus assistant professor ranks for all identifiers except Wikidata. It breaks down, however, when comparing assistant professors with non-tenure track faculty. Despite having lower expectations for research productivity, the latter group outpaces the former in all identifiers except Wikidata. The reason for this may be accounted for by the fact that assistant professors are in the early phase of their careers and are still forming a substantial research footprint, whereas non-tenure track faculty may be more seasoned academics and have had time to accumulate a body of scholarly work.

Table 3. Incidence of CU Boulder faculty identifiers by academic rank.

Academic Rank	**ORCID** (*n* = 1,806) *n* (%)	**ISNI** (*n* = 1,178) *n* (%)	**VIAF** (*n* = 1,011) *n* (%)	**LCNAF** (*n* = 885) *n* (%)	**Wikidata** (*n* = 849) *n* (%)
Tenured/Tenure Track	1,314 (73)	927 (79)	812 (80)	705 (80)	712 (84)
Professor	598 (33)	524 (44)	452 (45)	412 (47)	387 (46)
Associate Professor	393 (22)	291 (25)	247 (24)	221 (25)	158 (19)
Assistant Professor	323 (18)	112 (10)	113 (11)	72 (8)	157 (19)
Non Tenure Track	375 (21)	166 (14)	121 (12)	111 (13)	62 (7)
Other Faculty	117 (6)	85 (7)	78 (8)	69 (8)	75 (9)

Prevalence of Identifiers by Academic Discipline

Given the previous examination of the disciplinary aspects of identifier systems, some hypotheses were drawn about the types of identifiers that CU Boulder faculty in certain academic disciplines were most likely to have. It was assumed that a higher percentage of faculty in monograph-centric areas like the arts, humanities, and social sciences would have LCNAF and VIAF identifiers than those in other fields. It was also expected that CU Boulder scholars in engineering, the hard sciences, and law, fields in which journal articles are the predominant publication type, would be better represented in the ISNI database than in the LCNAF and VIAF.[52]

These hypotheses were largely borne out in the findings of this study. Figures 2 through 6 show the percentage of faculty within an academic unit having each type of identifier. Considering ORCID's

prevalence among all CU Boulder faculty, the results shown in figure 2 indicate that the campus's promotional efforts have been quite effective in most academic departments. An intriguing discovery was that music faculty were the best-represented group of CU Boulder scholars among all identifier systems, having the highest percentage of LCNAF, VIAF, and ISNI identifiers and in the top half of Wikidata. Although this was an understandable outcome in the case of the more cross-disciplinary ISNI, it was a rather surprising finding for the LCNAF and VIAF given their reputation for being monograph-centric databases. This phenomenon might be attributed to the industriousness of NACO music catalogers, but a deeper analysis of NACO and VIAF records is needed to detect a cause.

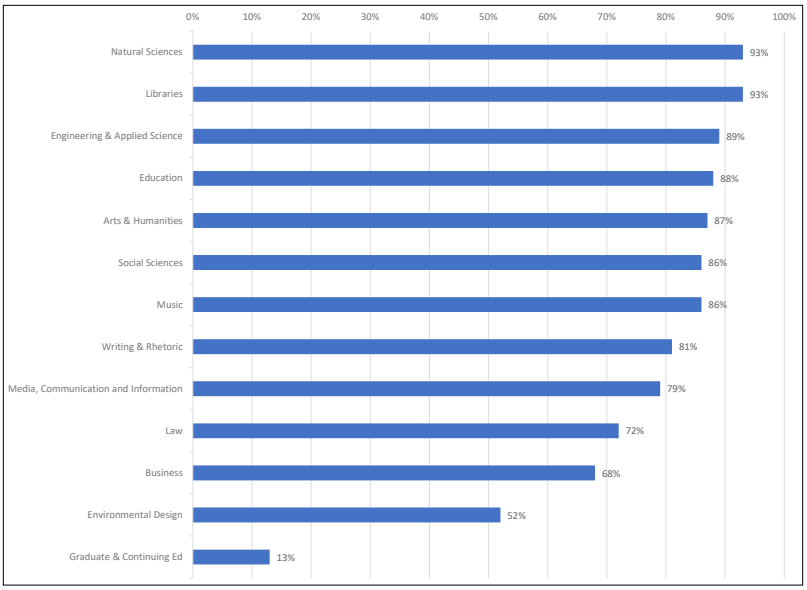

Figure 2. Percentage of faculty with ORCID IDs within CU Boulder academic units

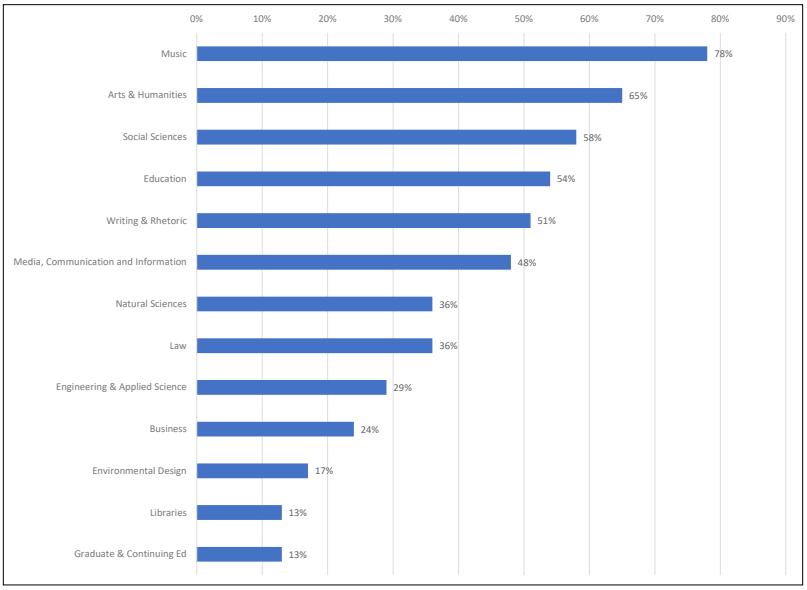

Figure 3. Percentage of faculty with LCNAF IDs within CU Boulder academic units

Less surprising is the high incidence of LCNAF, VIAF, and ISNI identifiers among arts, humanities, and social science scholars. As noted, faculty in these areas deem monographs an important indicator of research quality, although many also publish journal articles.[53] This aligns with observations in Panigabutra-Roberts' study, which also found that humanities and social sciences are better represented in the LCNAF and VIAF than the sciences and engineering.[54] Faculty in the field of education also landed in the upper tier of all identifiers.

Also expected was the predominance of ISNI and Wikidata identifiers among engineering and applied science and natural sciences scholars over VIAF and LCNAF. Faculty in engineering and applied science were near the top in ISNI and Wikidata but were in the lower half of LCNAF and VIAF, which validates the previously discussed assertion that these databases tend to exclude authors who produce chiefly journal articles. It must be noted that the prevalence of ISNI identifiers among engineering and

applied science faculty was influenced by CU Boulder's participation in the PCC ISNI Pilot, in which local efforts focused on College of Engineering and Applied Science faculty, but only partly so since catalogers found that one-half already had ISNI records before their intervention. Faculty in the natural sciences had the highest percentage of Wikidata items but were near the middle of the pack for all other identifiers. Likewise, scholars in fields like writing and rhetoric and media, communication, and information tended to be in the middle range for all types of identifiers. Law, business, and library faculty were in the lower tier for all identifiers; further investigation is needed to determine why.

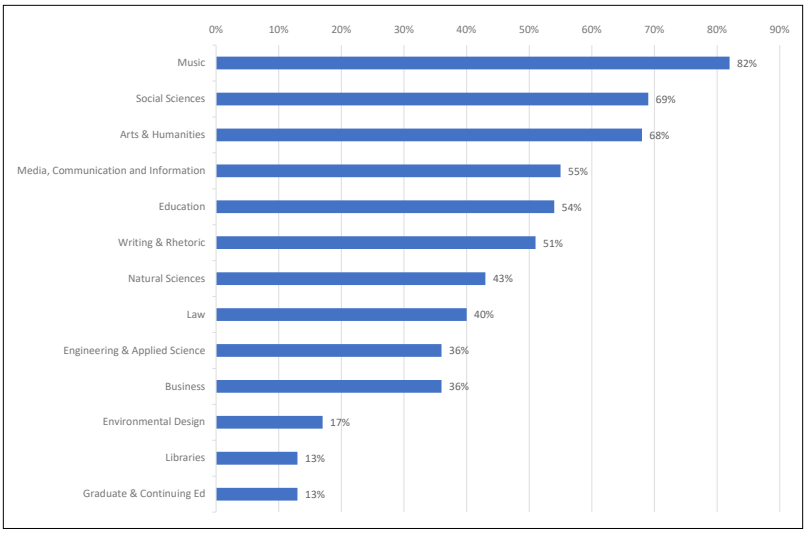

Figure 4. Percentage of faculty with VIAF IDs within CU Boulder academic units

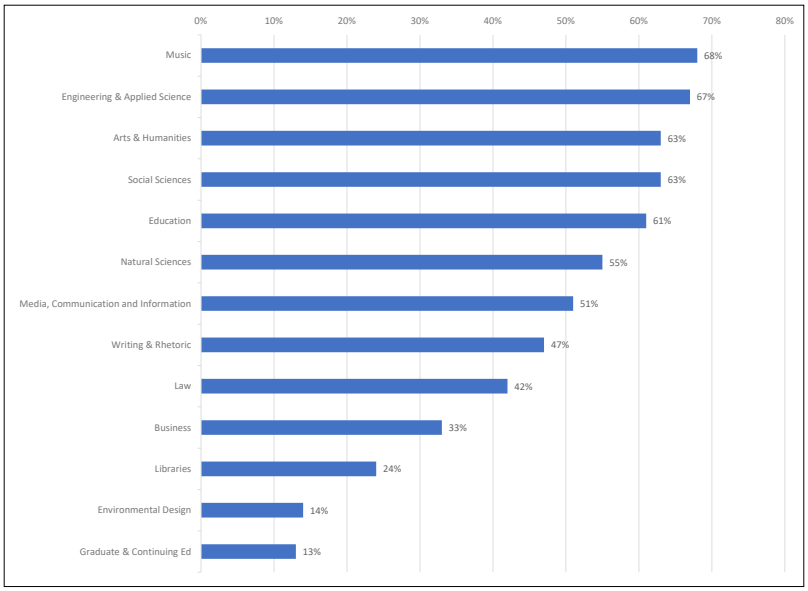

Figure 5. Percentage of faculty with ISNI IDs within CU Boulder academic units

Although identities in the LCNAF, VIAF, ISNI, and ORCID databases are mostly created from sources within the publishing universe, Wikidata items can be created by anyone and can describe any kind of entity. One might hypothesize, therefore, that the disciplinary divisions found in the other identifier systems would be absent in Wikidata. The data collected in this study does not support that hypothesis. Figure 6 shows a substantial disparity between natural sciences and engineering and applied science faculty and those in other disciplines. They hold the predominant places in Wikidata, in contrast to their lower percentages for most of the other identifiers. Conversely, academic disciplines like the arts, humanities, social sciences, and music, whose faculty had high percentages of LCNAFs, VIAFs, and ISNIs, lagged in Wikidata. Although an explanation is not readily apparent, it is possible that a closer examination of the types of contributors or bots in the Wikidata items' revision history might reveal a more concentrated effort in the Wikidata community to identify science scholars than other types. Business and law faculty continued to have a relatively low incidence of Wikidata, as they did with the other identifiers. It must be noted that,

although education faculty had the second highest percentage of Wikidata identifiers in this study, this is not an organic outcome due to the intervention of CU Boulder catalogers, who focused on CU Boulder education faculty while experimenting with creating and revising Wikidata items.

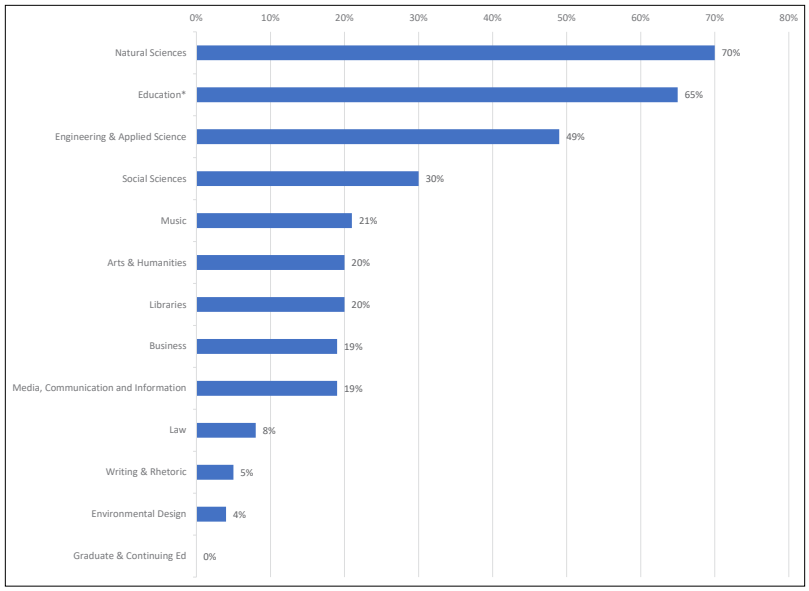

Figure 6. Percentage of faculty with Wikidata items within CU Boulder academic units

Multiplicity of Identifiers and Linkages among Identifier Systems

French and Fagan's 2019 article on the visibility of faculty researchers suggested that the presence of multiple research profiles increased the web discoverability of faculty and their publications.[55] Therefore, in addition to investigating the prevalence of individual identifiers, this study also examined how many CU Boulder faculty had multiple identifiers and what the most common identifier combinations were. Figure 7 shows the number of author identifiers per faculty. Although one-third have zero or one, slightly more than half have three or more and over one-third have four or five, demonstrating that most CU Boulder faculty have extensive identifier profiles.

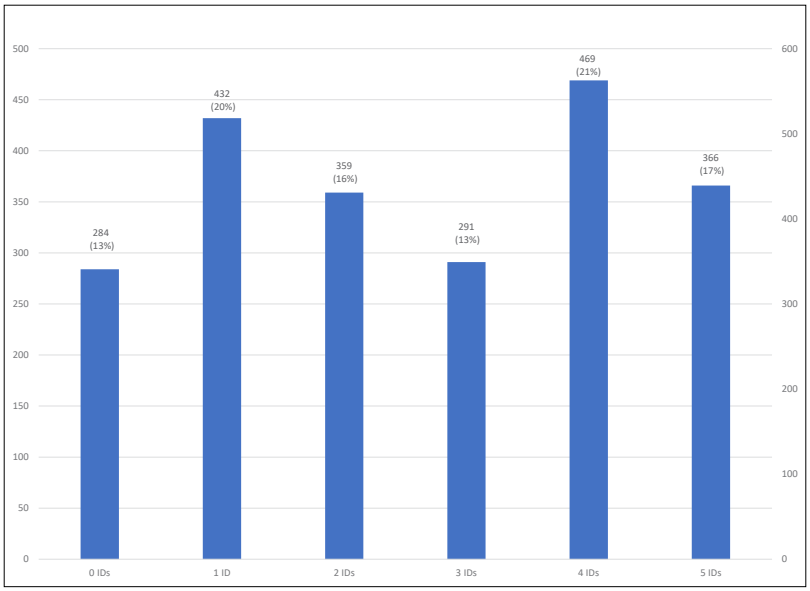

Figure 7. Multiplicity of identifiers among CU Boulder faculty

Figure 8 shows the number and percentages of the various combinations of LCNAF, VIAF, ISNI, and Wikidata identifiers. ORCID identifiers were excluded from this comparison since the ORCID database has limited interactions with the other databases. Given the previously discussed data sharing among VIAF, ISNI, and LCNAF, it is not surprising that 54 percent of CU Boulder faculty possessed all those identifiers. Figure 9 shows that the ISNI identifier appears in the most combinations (93 percent), followed by VIAF (85 percent), LCNAF (77 percent), and Wikidata (55 percent), mirroring the overall prevalence among CU Boulder faculty of each identifier. This ranking also aligns with the findings of Bianchini, Bargioni, and Pellizzari di San Girolamo regarding embedded identifiers in VIAF clusters.

Is Wikidata Operating as an Identifier Hub?

Wikidata's interoperability, combined with its richer entity descriptions and community-centered approach to eliciting contributions, has led some authors to posit that it may be a better solution for recording authority data than other identifier systems.[56] Indeed, Wikidata has been touted as an identifier linking hub because of its ability to house a multitude of other authorities, and thus ameliorate the challenges posed by scattered and divided identities recognized by Panigabutra-Roberts.[57] Perhaps more optimistically, it has even been proposed as the universal identifier.[58]

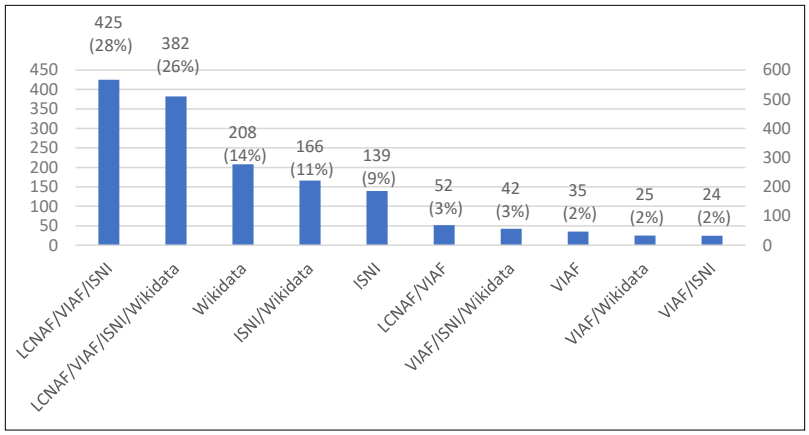

Figure 8. Combinations of identifiers among CU Boulder faculty

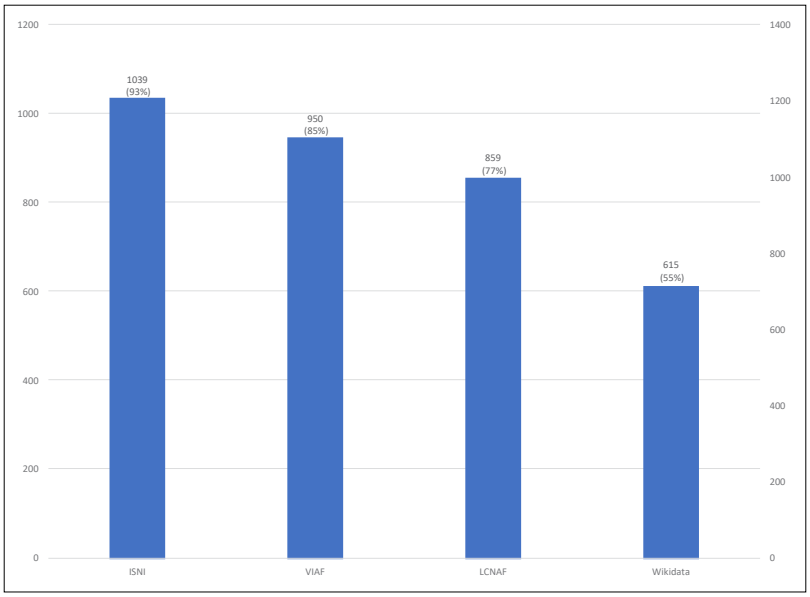

Figure 9. Frequency with which identifiers appear in combinations among CU Boulder faculty

During the data collection portion of this project, LCNAF, VIAF, ISNI, and ORCID identifiers found in Wikidata items for CU Boulder faculty were recorded. Figure 10 shows the results. Fifty-six percent of CU Boulder faculty Wikidata items contained a link to just one other identifier, almost 20 percent had none, and only 25 percent had more than one. Figure 11 shows the prevalence of each identifier within Wikidata items. ORCID identifiers had the highest frequency at almost 70 percent; this might again be explained by the work of bots mining ORCID's database and adding identifiers to Wikidata. VIAF, LCNAF, and ISNI identifiers, on the other hand, were present in a relatively small percent of Wikidata items. These findings indicate that, despite Wikidata's potential as a clearinghouse for author identifiers, much work yet remains for this promise to be realized.

Conclusion: Focusing CU Boulder Libraries' Identifier Efforts

Through their participation in the PCC and its recent pilot projects, RDS catalogers have embraced the PCC's strategic action item of "participation in ISNI, Wikidata and similar emerging Linked Data-based ventures."[59] However, one of this article's primary aims was to inform decisions about whether to

continue this work and, if so, where CU Boulder should concentrate its identifier creation efforts. Several strategies could be pursued. One option is to create, enhance, and connect identifiers in multiple databases. This decision would ensure a robust identifier profile for all CU Boulder faculty members. But although RDS has the requisite skills and authorizations to accomplish this, it must also consider its capacity to achieve it. Staff departures have diminished the team's ability to sustain the same amount of cataloging and identity management activity as before. There are plans to train more RDS catalogers to create NACO and ISNI identifiers, but only in limited numbers because preparing catalogers to perform that work is very labor-intensive in terms of instruction and review, especially with fewer experienced PCC-trained catalogers on hand to assist.

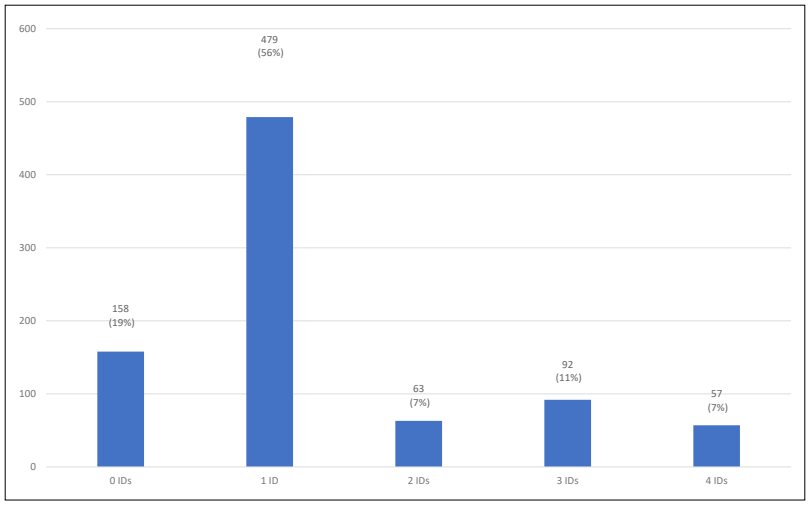

Figure 10. Numbers of identifiers in CU Boulder faculty Wikidata items

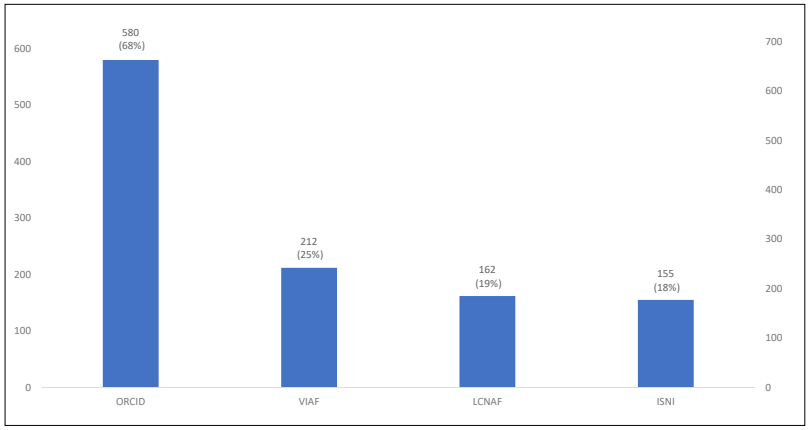

Figure 11. Prevalence of specific identifiers in CU Boulder faculty Wikidata items

In light of limited staff resources, another approach might be to focus efforts on only one or two identifiers. The data in figure 1 shows that Wikidata items and NACO authority records have the lowest incidence among CU Boulder faculty, and RDS could concentrate on bolstering those numbers to the greatest extent possible. Wikidata items are the most attractive choice because they are the least prevalent and do not require the same rigorous training as NACO records, allowing all RDS catalogers to contribute. In addition to Wikidata, RDS could continue to do a modicum of NACO authority records to maintain its PCC participation and abandon ISNI work, depending on ISNI registration agencies to create identifiers for a portion of CU Boulder faculty.

After weighing the choices and balancing capability and capacity, RDS intends to implement a plan involving Wikidata, ISNI, ORCID, and NACO identifiers, but with different levels of team involvement for each. The determining factor in pursuing a comprehensive approach was the demonstrated value in the professional literature to both the CU Boulder campus and its scholars of providing faculty with a strong scholarly profile that includes a multiplicity of author identifiers, which currently does not exist for every CU Boulder faculty member. As figure 7 shows, a third of CU Boulder's faculty have no or

only one identifier and only 18 percent have more than two, so the scholarly publishing process cannot be relied on to automatically generate robust identifier profiles for all researchers. There is ample opportunity for RDS catalogers to improve that situation, especially through the creation of Wikidata items and ISNI records. As noted in the literature review, faculty often lack awareness of their own identifiers and are unlikely to advocate for themselves, so it falls to catalogers to assume that work and advocate through action. Furthermore, in alignment with the observations in figures 3-6, Downey's study suggested that no single data source includes a "critical mass" of scholars from all academic disciplines, highlighting the impracticality of relying on a single identifier system and reinforcing the need for catalogers to create multiple types of identifiers.[60] Working in multiple systems also gives RDS catalogers the ability to interlink identifiers in each system, thereby acting as both creators and cross-pollinators and fulfilling the PCC's goal of more engagement with linked data.

The team's Wikidata project will be the most inclusive since it will involve all RDS catalogers and encompass all CU Boulder faculty. Using the data compiled for this study, catalogers will create new Wikidata items for faculty and enhance existing ones, including statements on academic discipline, affiliation with CU Boulder, and other information found on their public-facing profiles, as well as adding LCNAF, VIAF, ISNI, and ORCID identifiers when available. This part of the plan is the easiest to implement on a broad scale since Wikidata's low training barrier permits all staff to be quickly trained. It concentrates the most effort on the least prevalent identifier and is an additional step in turning Wikidata into an identifier hub, given that 75 percent of current CU Boulder faculty Wikidata items include either no or one link to another identifier in this study. This project also offers hands-on linked data experience for CU Boulder catalogers and gives them exposure to a wider range of identifiers than they normally encounter in their cataloging work. The assignment, however, is not without challenges, foremost of which is designing a template of data for new Wikidata items that is robust yet practical, allowing catalogers to create fulsome descriptions while still completing the project in a reasonable timeframe. Furthermore, for staff accustomed to following rigorous cataloging rules and working in a rather siloed environment, Wikidata's lack of best practices and an open policy of community editing might be a source of frustration and cause them to feel that other contributors might compromise the quality of their work. However, once RDS catalogers attain a sufficient level of familiarity and comfort with Wikidata, the team might do as other libraries have done and progress to creating Wikidata items for our faculty's publications and linking them to the individual's Wikidata item to further boost their scholarly profiles.[61]

By contrast, the team's continuing NACO efforts will be much more restrictive than those for Wikidata in that not all RDS catalogers will take part, nor will a NACO authority record be created for every CU Boulder faculty member. In addition to being foundational to the University Libraries' continued participation in the PCC, NACO work enriches the overall identifier ecosystem in several ways. NACO records are ingested into VIAF, and RDS catalogers can also create linkages to other identifier systems within records by using the MARC 024 field. Using automated tools like the Authority Toolkit can reduce the manual effort needed. Even considering these benefits, though, NACO work by itself will never be a sufficient solution to enhancing all faculty members' identifier profiles. The labor intensity of

both the training and the performance of the actual work precludes most cataloging departments from creating NACO records for all campus faculty. This obstacle is compounded by the need to base NACO descriptions on "literary warrant" and how an entity represents itself in resources.[62] As previously discussed, this privileges monograph authors, since the information is relatively easy to find in the normal course of cataloging work, but disadvantages journal article writers because much extra effort would be needed to scour journal indexes and find representation. However, RDS plans to conduct NACO training for several new catalogers, after which the team may be able to proactively target CU Boulder scholars in disciplines that tend to have a fairly low incidence of NACO records, such as those in law and business.

The RDS Team's resumption of its ISNI work will strike a balance between its capability and capacity. In its first steps, this will involve fewer catalogers and target only CU Boulder faculty in academic disciplines that have lower rates of ISNIs. ISNI work, although still time-consuming, does not carry the same requirements as NACO. There is no need to create a unique, preferred form of name text string, nor do all assertions in an ISNI record need to be justified by external sources, enabling both PCC and non-PCC trained staff to participate. Eventually, every RDS cataloger can be trained for ISNI work, making it then feasible to create or enhance ISNI records for all CU Boulder faculty and provide an additional identifier for almost half of CU Boulder's faculty. RDS catalogers can also integrate ORCID identifiers into the ISNI records they work with. As more catalogers are trained in ISNI, RDS can implement a phased plan that focuses first on faculty in academic disciplines with lower rates of ISNIs and then progresses to those with higher rates. This approach takes advantage of efficiencies inherent in the scholarly publishing process, since ISNI assignation may be done for faculty publishing in journal-centric fields by ISNI's journal aggregator data providers like ProQuest and Scholar Universe and thus reduce the workload for RDS.

All libraries are able to contribute to the broader identifier ecosystem in some fashion, although substantial obstacles exist for certain identifier systems. NACO participation has a high barrier for entry in terms of training and ongoing review. The need to establish a unique authorized heading based on a preferred form of name as well as the obligation to provide external references for all assertions made in the record make creating NACO records a very labor-intensive process. It is therefore not surprising that less than 10 percent of the library community participates in the NACO program.[63] Although ISNI training is less stringent, involvement is restricted because participation is predicated on institutional membership in the PCC. Wikidata, on the other hand, has a very low barrier to participate and no formal training and review requirements to meet, so catalogers of all stripes can create Wikidata items for campus faculty or other constituencies and embed other identifiers in them, thereby bolstering faculty scholarly profiles, augmenting their Web presence, and enriching the overall identifier ecosystem.

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FEATURE

Math and Aftermath

Impacts of Unbundling a Large Journal Package on Researcher Perceptions and Behavior

Kizer S. Walker, Adam Chandler, Caitlin Finlay, Gabriela Castro Gessner, Tobi Hines, Jesse Koennecke, Susan Kendrick, Leah McEwen, Jacob Sayward, and Henrik W. W. Spoon

This study seeks to understand the effects of a shift from a near-comprehensive journals package with a single, large publisher to a selective list of individual journal subscriptions on the work of researchers at a large research university. Analyzing historical journal usage, along with turnaway and interlibrary loan trends from the years following the changes, the authors made use of structured interviews with local researchers to bring context and meaning to the quantitative data. The interviews highlighted researchers' strategies for gaining access to literature in their fields to which the library does not subscribe, and revealed assumptions about timeliness of access, as well as relationships between library subscriptions and local researchers' publishing behavior.

Like other academic research libraries worldwide, Cornell University Library has for many years relied on large, multiyear licenses for comprehensive electronic journal packages offered by the world's largest commercial academic publishers. While providing access to major segments of the scientific and scholarly journal literature, these "big deal"-style licenses consume an ever-increasing share of library budgets and reduce libraries' flexibility to make literature from other sources available to researchers. It should also be noted that not every journal in these catch-all packages will match the research profile of every institution or necessarily receive a great deal of use at any one institution. For Cornell University Library (the Library), working with a flat collections budget over several years and facing significant annual increases to the cost of the big vendor licenses, the situation had become unsustainable by 2018,

Kizer S. Walker (kw33@cornell.edu), Director of Collections, Cornell University Library, https://orcid.org/0000-0002-3036-7036. **Adam Chandler** (alc28@cornell.edu), Director, Automation, Assessment, and Post-Cataloging Services, Cornell University Library, https://orcid.org/0000-0003-2204-3522. **Caitlin Finlay** (cmf7@cornell.edu), Department Head, Interlibrary Services, Cornell University Library. **Gabriela Castro Gessner** (agc24@cornell.edu), Director of Assessment and Planning, Cornell University Library, https://orcid.org/0000-0003-2991-2516. **Tobi Hines** (eeh53@cornell.edu), Assistant Director of Access Services, Cornell University Library, https://orcid.org/0009-0007-9439-7641. **Jesse Koennecke** (jtk1@cornell.edu), Director, Acquisitions & E-Resource Licensing Services, Cornell University Library, https://orcid.org/0000-0003-4047-6735. **Susan Kendrick** (sfk23@cornell.edu), Business Research & Data Librarian, Cornell University Library, https://orcid.org/0000-0002-6220-3482. **Leah McEwen** (lrm1@cornell.edu), Chemistry Librarian, Cornell University Library, http://orcid.org/0000-0003-2968-1674. **Jacob Sayward** (sayward@umn.edu), Associate Director for Collection Development, Law Library, University of Minnesota, http://orcid.org/0000-0001-6651-5216. **Henrik W.W. Spoon** (h.spoon@cornell.edu), Physics, Astronomy and Mathematics Librarian, Cornell University Library, https://orcid.org/0000-0002-8712-369X.

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when the three-year licenses with our three largest publishers—in terms of expenditure—were coming to a close and up for renegotiation. The Library set a firm goal to arrive at terms by which the average expenditure for 2019, 2020, and 2021 on journals from our three largest journal publishers, based on total spend, would be no greater than our total expenditure in 2018. We built various scenarios that would fulfill this goal and we negotiated terms with all three publishers, letting our negotiation partners at each publisher know the spending constraints the Library had set. Two of the publishers showed little inclination to think creatively about new options, but offered minor concessions; one was more willing to work with us on our challenge. In the end, we determined that our best option was to leave two of the three deals in place, with annual increases controlled as best we were able to negotiate, and to drop one of the deals, shifting to subscription access for a subset of journals from that publisher.[1] The cuts were deep: from a package that provided our campus with full access to over 1,450 journal titles, we moved to a curated set of around 600 subscriptions; among the titles dropped were one hundred journals that received over one hundred uses each, on average, in 2016 and 2017.

We based decisions about which titles to include in the new subscription package on historical usage and cost, along with more subjective factors. Our calculations around holding the total expenditure across the three publishers at the 2018 level were based on the average of total spend over the previous three years. The cuts made were deep enough to accommodate annual increases built into the licenses with all three, and there was significant savings in the first year of the new arrangement. The Library set aside a portion of these savings to support what we expected might be a sharp increase in interlibrary loan (ILL) activity with requests for articles from the canceled titles. We also simplified our ILL form with a new Digital Object Identifier (DOI) lookup feature to reduce friction for our users. Yet as we monitored turnaway counts (i.e., failed attempts to access non-subscribed journals) and interlibrary loan requests over the first year, we saw considerably less activity around the canceled titles than we had anticipated: turnaways from non-subscribed titles amounted to only about 13 percent of average annual usage counts from the same titles from the previous two years; interlibrary loan requests from those titles came to only about 1 percent of the turnaway numbers in that first year. At first blush, in other words, Cornell patrons seemed to be attempting to access articles in these journals to which the Library is no longer providing access at a significantly lower rate than articles in those journals were used historically. And they were requesting these articles through interlibrary loan at a much lower rate than they were attempting to access them.

Before and after unbundling, the journal package under consideration covers affiliates of Cornell's Ithaca, New York, campus (around 1,600 academic staff, 10,000 graduate students, and 16,000 undergraduates), the New York City campus of Cornell's Weill Medical College (around 1,800 academic staff and 400 medical students), and the Cornell Tech campus, likewise in New York City (around 50 faculty members and 600 graduate and professional students). Historical usage and turnaway data includes Ithaca, Weill Medical, and Cornell Tech users, while the ILL numbers reflect affiliates of the Ithaca campus only. Our findings about the ratio of ILL requests to turnaways should be read with this limitation in mind. Turnaway and ILL data from the first year of the new arrangement presents a somewhat skewed picture, because content from years prior to cancelation remained accessible for

nearly all of the canceled titles: we expected that turnaways would increase as time went on. Indeed, three years later, the ratio of turnaways to pre-cancelation usage is about double what it had been in the first year after cancelation: turnaways in 2022 reached 27 percent of average annual usage counts from the same titles in 2016 and 2017, while the ratio of turnaways to ILL requests remained about the same (approximately 1.2 percent in 2022). Yet, even anticipating a rise in turnaway counts, the difference between historical use and current activity around these journals seemed significant. We wanted to understand the real impact on Cornell researchers of the Library's move from providing comprehensive access to the journals supplied by a major academic publisher to a curated subset of the journal list. We concluded that the only way to understand the effects of the changes would be to ask the researchers themselves.

Cornell librarians designed a research project to widen the view of the impacts of leaving a big deal, with the aim of providing a framework for future, local deliberations, as well as some parameters that we hope will be useful for the broader community. In addition to tracking quantitative measures of historical journal usage, turnaway data, and interlibrary loan requests for non-subscribed titles previously in the journal package, we worked with Cornell's Institutional Review Board (IRB) for Human Participant Research on a protocol for structured interviews with Cornell researchers who had recently cited or published in the non-subscribed journals or had requested an article via interlibrary loan. Our study posed the following research questions:

- RQ1. What explains the differences between historical usage, current turnaway attempts, and follow-through to ILL requests?
- RQ2. What strategies did users employ to gain access to an article from a canceled subscription?
- RQ3. What does timeliness mean in different research contexts?
- RQ4. Is change in access impacting where researchers are publishing?

In what follows, we present the results of the quantitative and qualitative aspects of our research and seek to draw conclusions about how researchers' expectations about access and the particular ways in which they use the journal literature relate to licensed access, as well as how libraries' decisions about journal packages impact the work of researchers at their institutions.

Literature review

Interlibrary loan (ILL) refers to a cooperative agreement between libraries that enables books and other materials from one library to be loaned to a patron from another library. Document delivery is "the provision of published or unpublished documents, generally electronically and sometimes for a fee . . . [and] may also refer to the electronic delivery of documents from a library to a patron."[2] The practice of sharing resources between libraries to supplement existing collections and limited budgets is a long-established library service that has always faced logistical challenges. The nature of those challenges has changed dramatically over the past thirty years due to rapid technological advancements. In the 1980s and 1990s for example, "enhanced automated discovery and request functionality provided by online catalogs resulted in a bonanza for large academic collections, which were able to capitalize on their

statuses as 'net lenders' to fund their [ILL] operations entirely on a cost-recovery basis."[3] Local and regional consortial agreements between institutions paved the way for large academic library consortia that emerged "as a response to shrinking collection development budgets and an explosion in scholarly publishing."[4]

The growth of electronic resources in the early twenty-first century introduced new problems for ILL and document delivery. "As libraries began to shift from the ownership of print-based serials to the license of access to online resources, the rules that govern the resource-sharing of a collection have undergone significant changes. While ILL staff have always been aware of copyright laws they must now learn licensing provisions, which may restrict access."[5] Beyond the complications of licensing restrictions, which often supersede copyright guidelines, there are also the challenges of multiple modes of fulfillment, including "consortial borrowing/lending platforms, third-party article delivery services, pay per view, purchase on demand, and other 'ad hoc' means of resource sharing" between patrons themselves.[6] In addition to these issues is the complication of high patron expectations, which have evolved in lockstep with the technology. "Technological innovations have created faster and more efficient ILL operations over the years, while at the same time users' expectations are constantly growing—they want their materials fast, electronically, and free (no matter how rare those materials may be)."[7]

The current literature on the impact of journal cancelations on ILL usage indicates that many libraries have encountered only a small increase in ILL requests, similar to what we have seen at Cornell. Simard, Priem, and Piwowar reviewed eleven studies of journal cancelations and their impact on ILL.[8] Most noted an increase of less than 2 percent in ILL requests for canceled journals in the first year or two after cancelation.[9]

Many of the studies focus on the immediate impacts of journal cancelation. Since most academic articles have a citation window of around five years,[10] and our library was able to maintain post-cancelation access to articles in subscribed journals published prior to cancelation, we had an especially keen interest in Nabe and Fowler's research at Southern Illinois University-Carbondale.[11] In their study, Nabe and Fowler reviewed ILL requests one year after journal cancelations and again five years later. This longer timeline meant a larger pool of inaccessible articles to drive ILL requests and more time for discoverability and requests. Their early review showed a small increase—0.9 percent—in ILL requests for the top 25 percent of journals.[12] The five-year review showed increases in ILL requests each year to a total of 1,118 requests of the canceled journals over that period, which is 10 percent of the total downloads of these journals the year before cancelation.[13] While the number of ILL requests increased each year, 47 percent of the canceled journals still had no ILL requests over the five-year period. They found that at least 75 percent of the canceled journals received no ILL requests in any given year, so it appears that a small number of journals were driving the requests.

Librarians' hypotheses concerning the seemingly low rise in ILL requests in proportion to the number of canceled journals after a large cancelation generally fall along two lines: (1) historical download and turnaway counts are inflated by researchers browsing articles that are not necessarily essential to

their work; and (2) researchers are accessing articles in canceled journals by means other than ILL, such as finding publicly available versions, relying on professional contacts or social media. Researcher behavior and attitudes when faced with canceled journals appears to be related to academic discipline, to some degree, and, perhaps not surprisingly, also to researchers' individual roles at the academic institution (faculty, graduate student, undergraduate). Journal cancelations tend to be viewed more negatively in the health sciences and engineering fields and less so in the humanities and social sciences, where the perceived impact may not be as great.[14] When faced with an inaccessible article, undergraduates first look for a substitute article, while graduate students and faculty first look to ILL and then utilize their networks including social media. If those options are not successful, they too will resort to substitution.[15] Although graduate students and faculty tend to be comfortable using ILL, the discrepancy between the large number of downloads of articles pre-cancelation and the small number of ILL requests post-cancelation may be due to the way they research. Knowlton, Kristanciuk, and Jabaily found that users, when presented with an ILL request link instead of full text, requested an ILL copy only 31 percent of the time.[16] In other words, for every article requested, two were not. The authors invoke Nabe and Fowler's suggestion that this apparent hesitation to make an ILL request may be a matter of researchers being more selective when it really matters, in other words that frictionless access to full-text journals inflates usage, with users downloading nonessential items because they can. But Knowlton et al. offer an alternative explanation, namely that the inconvenience of ILL may be artificially depressing demand. They question the notion that ILL, as an alternative to subscription access, satisfies patrons' needs and propose three possible explanations for why so many patrons stop along the path towards a complete ILL request. The authors posit that many patrons have immediate needs for articles that cannot wait, that ILL user interfaces are awkward and confusing, especially to first time users who are required to create an account, and that patrons perceive ILL as additional work for library workers and wish to avoid creating a burden. In the view of Knowlton et al., carefully planned cancelations of serials are unlikely to lead to a large increase in ILL activity. Users want to know if an article is worth the effort. The pre-cancelation download figures could be in part an indication of casual browsing and may be an exaggerated indicator of actual demand.

Other research examines alternative avenues of access, comparing ILL to less formal means. Tenopir et al. used surveys and focus groups to discern patterns of informal sharing of articles among colleagues and motivations for doing so.[17] The authors observe that informal sharing is "intrinsic to scholarship" and serves as an "important means of content discovery and dissemination."[18] Scholars who participated in the study say they share articles primarily to "further scientific and academic discovery," "facilitate collaboration," and "fill an information need."[19] Regardless of rights retention, scholars who took part in the study tended to see the articles they authored as "still the fruit of their intellectual labour" and to feel a responsibility for disseminating them.[20] Tenopir et al. observe that one effect of the high rate of sharing is that publisher-supplied usage counts for articles licensed by libraries for full-text access are likely lower than actual use, since they do not capture these "secondary" uses of the shared article.[21] This creates an interesting counterpoint to the observation of Nabe and Fowler and others that usage statistics may be inflated by ease of access.

Walters surveyed scholars in large-to-medium-sized colleges and universities around the US about the extent to which they access both books (and book chapters) and journal articles via their home institution's library, and how much they rely on various external sources.[22] Walters found that the home library together with interlibrary loan accounted for 51 percent of journal articles accessed, with scholars finding the rest through various other means, including (in order of frequency): "freely available online resources," "personal subscriptions/purchases," "departmental subscriptions/purchases," and "authors or colleagues."[23] The Walters study may suggest that the alternative pathways to article access, which are already in place via researcher networks, are preferred to using ILL after cancelation.

Segado-Boj et al. conducted an international survey of researchers on their means of gaining access to articles behind paywalls that are not licensed by their institution. The authors designed the study to account for use of piracy sites (e.g., SciHub), so-called "black OA [open access]."[24] They found the most common approach for researchers who did not have access to a paywalled article was to look for open access articles, followed by asking colleagues or authors for a copy. Piracy sites, ILL, and paying for the article themselves fell much lower in the desired approach. While more than half of the respondents had used a pirate site at least once to get a paywalled article, it is not the preferred method.

Kohn describes changing journal usage patterns at Temple University following the library's 2018 renegotiation of its big deal package with Elsevier, which reduced the number of Elsevier journals approximately by half.[25] Although usage of subscribed journals declined around 16 percent after the change, this followed a pattern of falling usage for subscribed titles, and the causes are difficult to parse, particularly with the interference of the COVID pandemic as well as enrollment changes at Temple. ILL requests for content from canceled journals did not increase dramatically. Kohn hypothesizes that the general drop in use of subscription content and the apparent drop in demand for non-subscribed content relates to an increase in reliance on open access (she refers to OA's role in users' "compensatory behavior for the loss of some subscriptions").[26] Kohn notes that studies focused exclusively on usage data before and after journal cancelation do not address "patrons' feelings about being forced to pursue alternate means of accessing articles."[27]

The question of which inputs to consider when canceling or retaining journals is of particular importance to collection development librarians. Johnson and Cassady looked at the decision process for journal cancelations at the University of Western Ontario.[28] The occasion for the study was a cancelation project that would have shifted from big deal-style access to Wiley journals to subscription access to a subset of Wiley titles. The cancelation project was abandoned because the collection development librarians could not agree on which titles to retain. The study revealed a more or less even split among librarians involved between those who favored "subjective" criteria (discussion with faculty, subject knowledge, attention to disciplinary differences) and those favoring "data-driven" criteria (cost, usage, faculty survey data) in deciding on cancelation and retention. The use of subjective factors in decision-making correlated with strong relationships, as reported by the librarians involved, with faculty in the respective disciplines.

Jabaily provides a review of several studies that looked at "predictability of future use" of journals.[29] Where libraries typically use vendor-supplied usage data to predict future use of journals to which they already provided licensed access, Jabaily focuses on indicators of potential use of unsubscribed journals for which local usage statistics are not available. The author discusses the findings of studies that highlight various indicators: the use of similar resources in the collection, citations of a journal and its impact factor, ILL requests, turnaways, and failed link resolver requests. Perhaps most pertinent to our study, Jabaily summarized the findings on turnaway/denial counts in predicting potential use: "The research into the usefulness of denial reports is limited, and the extent to which denials correlate with future use is still unclear."[30]

Research libraries use publisher-supplied turnaway data—a measure of past attempts by institutional users to access electronic resources that the library has not purchased or subscribed—to help predict future demand and inform collection development decision-making. Turnaway data might indicate campus interest in a resource that the library has never provided, or in a post-cancelation context, turnaways can indicate the level of continued demand for a journal title that the library offered previously, but has now dropped. Because the cost of supplying individual journal articles from canceled journals weighs against the cost savings achieved by canceling subscriptions, the question of continued demand is an important economic factor in the wake of a large reduction to a journals package. However, the relationship between turnaway counts and user demand expressed in ILL requests is not straightforward. Smith found a moderate correlation between reported turnaways and ILL requests, reporting that the total number of ILL requests represent just over 11 percent of the total number of turnaways across all five publishers in the 2019 study (Elsevier, Wiley, Springer, Taylor & Francis, and SAGE).[31] Smith suggests that while there is a relationship between turnaway counts and the number of ILL requests, there are other factors at play. Because libraries may make resources available on multiple platforms, not every turnaway indicates a lack of access; some ILL requests for non-subscribed items are placed without the user first generating a turnaway, for example. Smith cites Nash and McElfresh, who conducted a user survey in connection with a 2014 cancelation project at the University of New Mexico Health Sciences Library and Informatics Center, and follow-up examination of turnaway reports and ILL requests. The authors found that canceled journals had not been requested via ILL with any frequency, and they "did not find any correlation after comparing the number of turnaways with the number of ILL requests."[32] Nash and McElfresh point to a shortcoming of the COUNTER Release 4 JR2 turnaway reports: they do not indicate year of publication for the article generating the turnaway, which can complicate efforts to understand post-cancelation demand for new content if there is a journal backfile to which the institution has no access. The authors concluded that turnaway data "did not provide much insight into the success or failure of [their library's] cancelation decisions."[33] As part of an evaluation of the SAGE Premier journals package at Auburn University, Grabowsky et al. used linear regression analysis to understand the relative value in predicting future use of a journal represented by past ILL requests alone and ILL requests in conjunction with turnaway counts.[34] The authors found that "ILL requests by themselves represent the best predictive model for subsequent journal usage, accounting for almost 30% of the proportion of variance in usage," while

journal turnaways "were not significantly correlated with usage and did not add any significant increase to the proportion of variance explained by ILL requests."[35]

Methods

Quantitative: Turnaways and ILL Requests for Non-Subscribed Titles

We analyzed COUNTER-compliant turnaway reports (Release 5, TR_J2) provided by the publisher to understand Cornell patron behavior on the publisher platform over the four years following cancelation of the 853 titles in our study. A key challenge in working with these reports is matching them to the original list of titles in our study. Scripts in the programming language R were written to match titles by International Standard Serial Number (ISSN) turnaway counts across years, and to reformat and summarize the output. For ILL requests, our ILLiad transaction database was queried using R scripts to match the titles in our study dataset against the journal title field in ILLiad, with text strings normalized to remove punctuation.[36]

Qualitative: Interviews and Analysis

We developed an interview protocol that was approved by Cornell's Institutional Review Board (IRB) for Human Participant Research. The ten Library colleagues working with the interview material received required IRB training and certification. To form our interview pool, our goal was to invite Cornell researchers who had a significant relationship with the titles we had dropped from the publisher package. We developed a pool of potential interviewees who had either recently published in one of the non-subscribed journals, cited one of these journals in a recent publication elsewhere, or requested one of the non-subscribed titles via ILL. The author pool included faculty, graduate students, postdocs, and academic research staff affiliated with Cornell's Ithaca campus. We thought of these researchers as "super-users" of journals in the publisher package.

To identify Cornell researchers who had either published in a journal from the publisher package under consideration or who had cited an article published in one of these journals, two searches were conducted in early February 2021. The Web of Science Core Collection was used to search for Cornell authors on articles published in 2020 in a journal in the package. The Scopus database was used to search for Cornell researchers who cited articles from one of these journals in their own articles, regardless of publisher, published in 2019 and 2020. Despite limitations of these or any bibliographic databases, we felt that Web of Science and Scopus had broad enough coverage of Cornell authorship for our purposes. The result sets were further analyzed to include only Cornell researchers from the main (Ithaca, New York) campus from among multiple co-authors and to identify their affiliated departments at Cornell. An R script was written to match titles from the unsubscribed journal title list to the ILLiad transaction database. Cornell requester names and email addresses were then pulled from those transaction records. The resulting lists were then randomized and researchers were contacted from each of these lists in turn until a pool of acceptable size had been identified.

Interviews

We sent 309 email invitations to these "super-users," which resulted in scheduling twenty-four Zoom interviews held over the course of two semesters (Fall 2021 and Spring 2022). We set aside an hour for each, but found the conversations tended to run thirty to forty-five minutes. The interviewees were distributed as follows, in terms of their relationship to the non-subscribed titles:

- Twelve had cited one of the titles in their published work
- Seven had requested an article from one of the titles via ILL
- Five had authored an article in one of the titles

And in terms of University status or career stage:

- Thirteen faculty (three emeritus)
- Four graduate students (two former)
- Four academic/research staff
- Three postdoctoral researchers (one former)

The disciplinary breakdown of interviewees roughly matches the profile of the publisher, with heavy representation in the sciences and social sciences and a smaller showing in the humanities. Limiting our study to researchers affiliated with Cornell's Ithaca campus meant that one of the publisher's key focus areas—medical science—received less attention than if we had extended our pool to the Weill Cornell Medical campus; participation of Ithaca-based researchers in Veterinary Science and Public Health may have offset this gap somewhat.

Table 1. Representation of broad disciplines and individual academic fields among the interview participants.

Count	Broad Discipline	Fields
2	Engineering	Chemical & Biomolecular Engineering, Environmental Engineering
2	Humanities	Archaeology, Philosophy
6	Life Sciences	Ecology & Evolutionary Biology, Integrative Plant Science, Ornithology, Policy Analysis & Management, Vet Science & Public Health
7	Physical Sciences	Chemistry, Chemistry & chemical biology, Accelerator-Based Sciences & Education, Earth & Atmospheric Sciences
1	Data Science	Statistics & data science
6	Social Sciences	Anthropology, Architecture, Art & Planning, Communication, Global development, Science and Technology Studies & Information Science

Two members of the study team met with each researcher, with one team member asking most of the questions and the other taking notes. The participants universally granted permission to record the Zoom interviews and we retained a Zoom-generated transcript for each. For each interview, then, we worked with three documents: the video, the automated transcript, and the team member's notes. These were kept in a secure folder in Cornell's Box file storage cloud; the text documents were anonymized and the videos deleted at the end of the calendar year 2022, as laid out in our IRB agreement.

In our interviews, we named several journals canceled from the publisher package in fields of the respective interviewees, but not necessarily the titles they had published in, cited, or requested. We asked them to discuss their experiences locating material that the Library does not provide, regardless of publisher.[37]

Findings

The average number of attempts to access one of the 853 non-subscribed titles increased steadily from year to year, more than doubling from an average of just over seven turnaways per title in the first year after cancelation to nearly eighteen in the fourth year out (table 2).[38] Since the volume of journal articles from the publisher that were not accessible for Cornell roughly quadrupled from 2019 to 2022 (four years of content up from one year), it is notable that turnaways only grew by a factor of 2.5.

Table 2. Journal turnaway and ILL statistics for 853 journals

Year	Pre-cancelation Usage	Turnaways	Turnaways / Journal	ILL Requests	ILL Requests/ Journal	ILL Request/ Turnaway
2016	64,103	—	—	—	—	—
2017	67,643	—	—	—	—	—
2019	—	6,158	7.2	52	0.061	0.0084
2020	—	11,585	13.6	140	0.16	0.012
2021	—	12,700	14.9	111	0.13	0.0087
2022	—	15,169	17.8	112	0.13	0.0074

The rate of ILL requests for articles in non-subscribed journals also rose after cancelation, growing from 2019 to 2020 before dipping from the highpoint and flattening, but it has remained low compared to turnaways (2022 ILL requests were 0.74 percent of 2022 turnaways) and extremely low compared to pre-cancelation usage of the non-subscribed titles (2022 ILL requests were 0.17 percent of average 2016–2017 usage).

Importantly, we found that the turnaway rate and the relationship between pre-cancelation usage counts and post-cancelation turnaways varied significantly by discipline. Figure 1 shows how Cornell's 2016 and 2017 usage for the journals canceled in 2019 relates to turnaways between 2019 and 2022, broken down by top-level Library of Congress Classification (LCC) class.[39] Note that both the highest pre-cancelation usage and the highest turnaways occur in the LCC classes Q (Science) and R (Medicine).

We also observed that the rate of growth in turnaways over the four years varied significantly by LCC class. In figure 2, the numbers have been scaled to unity in 2019 for each LCC class, i.e., every curve in the plot is scaled (up or down) so that the 2019 Y-axis value is one. This makes it easier to see differences in how the Y-axis quantity (the turnaways) evolved between 2019 and 2022 for each of the plotted curves. LCC classes listed at the top right are seeing a higher growth of turnaways than LCC classes at the bottom right. Of all LCC classes B (Philosophy, Psychology, and Religion), L (Education), and P (Languages and

Literature) show the strongest increase in turnaways relative to 2019: a factor of 5 to 11. The average increase is closer to 2.5.

The rising rate, year by year, of turnaways from the non-subscribed titles seemed to confirm our assumption that demand will increase as the amount of non-subscribed content increases and accessible backfile content grows older (of course, this only holds for the journals in the package for which Cornell retained perpetual access to the purchased backfile). The pace of this change over the four years of analysis is a significant finding for us, as is the variation by discipline in the relationship of turnaways and ILL requests to pre-cancelation usage. The results of this short-term longitudinal analysis[40] were not yet available in spring 2021, when the Cornell team drew up its proposal for the qualitative component of the study.

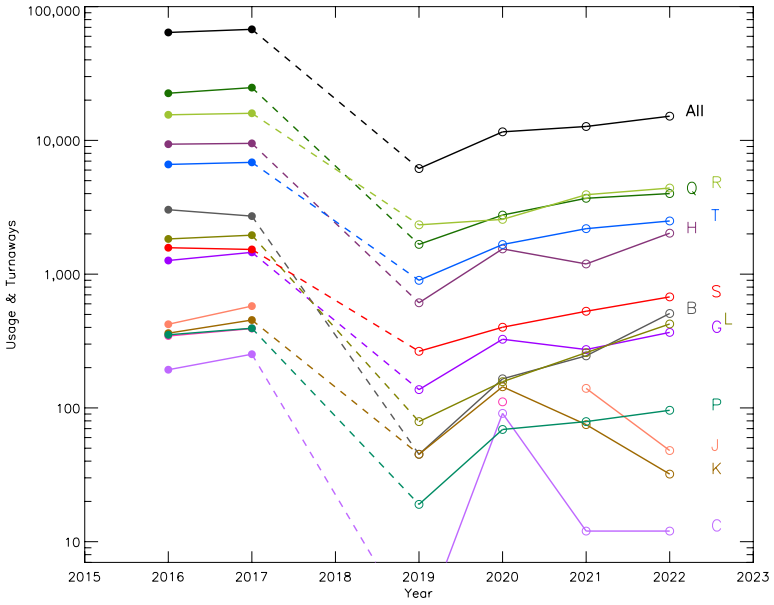

Figure 1. Pre-cancelation usage in 2016–2017 for the titles canceled in 2019 (filled circles) compared to the turnaway statistics for articles published in 2019-2022 (open circles).

RQ1. What explains the differences between historical usage, current turnaway attempts, and follow-through to ILL requests?

Subject domain is clearly one significant factor in patrons' post-cancelation behavior. Judging from the subjects covered in the titles where turnaways are higher, some disciplines on campus appear to have a greater need for canceled journals than others. We do not have data to explain these differences; they could be a matter of larger and smaller departments, or they could indicate that individual patrons in certain disciplines have a greater reliance on journals in their fields than their colleagues in other areas.

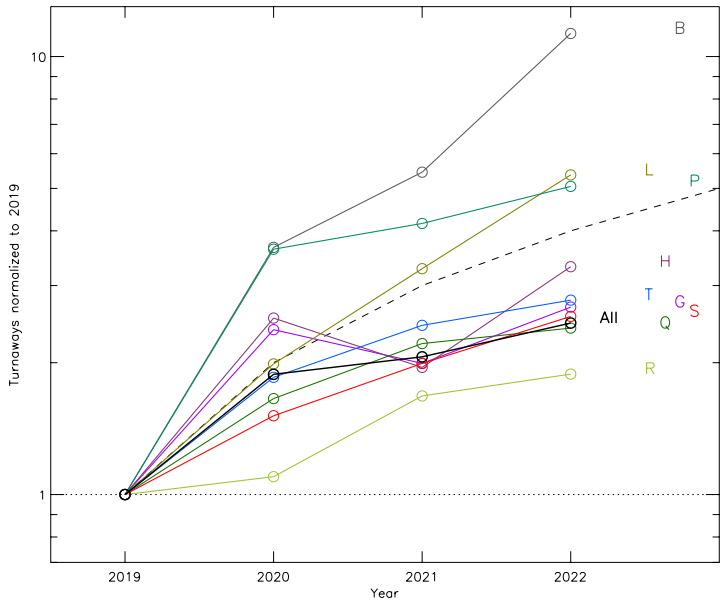

Figure 2. Evolution of turn-aways for journals canceled in 2019. The dashed line indicates the hypothetical evolution of turnaways after quadrupling of the inaccessible content between 2019 and 2022.

RQ2. What strategies did users employ to gain access to an article from a canceled subscription?

The experiences researchers described in locating material that the Library does not provide, regardless of publisher, revealed various strategies. Most of the participants combined different tactics employed at various times, conveying that they tried multiple ways of locating and accessing the needed article, rather than any single way. Although their preferences are very personal, perhaps habitual and idiosyncratic, they reveal five main approaches as summarized in table 3. The most common way the interviewees obtained the needed article was to rely on their own network, whether close disciplinary colleagues, the author of the needed article, or the wider academic community in platforms such as ResearchGate or Academia.edu. A smaller subset of our interviewees described relying on the Library catalog and databases, services offered by reference librarians, or using interlibrary loan. Four participants cited ILL as their first attempt in trying to acquire the article. A small number mentioned using ILL as a last resort, or using it sparingly, with one person specifically mentioning trying to avoid using ILL so as not to create more work for others. This lower reliance on ILL is reflected in the lower-than-expected requests that followed the cancelations described in this study, and this despite the praise that many of the interviewed researchers shared about the efficiency and usefulness of ILL for their research. Many participants reported searching some combination of Google, Google Scholar, ResearchGate, or Academia.edu, often as a first step. Use of preprints or freely available articles via arXiv (on one end of the scholarly communications spectrum) or SciHub (on the other) was not frequently mentioned. Purchasing articles or seeking articles directly from publisher websites was also not as common, although one interviewee said that he will occasionally purchase an article from the publisher if time is limited. Another participant explicitly stated that he never pays for access, even if it means he is unable to acquire the article. One faculty member in the humanities said he will purchase access to an article he needs, but only reluctantly and after all other avenues have failed:

> You end up spending your own money and trying to buy it yourself, which I greatly object to doing for articles . . . because the charges are absurd.

Overall, these alternate methods of attempting to acquire articles work well for most Cornell researchers, though it does seem that the time spent hunting down an article can be a concern, especially during article revision and resubmission. One participant, noting specifically discipline-related demands, carves out particular times of the year to work on research and writing; not having a needed article or the entire journal issue where that article was published, presents a significant hindrance. Few participants reported being unable to procure a copy of the article through any of these methods, though one interviewee acknowledged giving up the search when unable to find access to an article through Google Scholar. One participant said that reaching out to colleagues typically works well, with about a 50 percent success rate. Another participant said that requesting articles through ILL works well and reported satisfaction with ILL. The majority of researchers we interviewed seem to prefer to start their search with Google over the Library catalog or databases. Interviewees differed on their opinions of ResearchGate and Academic.edu, with one person reporting that needed articles are

Table 3. Strategies employed by researchers to obtain canceled or unavailable journal articles

Count	Mentioned Strategies	Broad Discipline	Participant Status
15	Network of colleagues; contacting author directly; academic community in Research Gate or Academia.edu	Engineering, Humanities, Life Sciences, Physical Science, Science, Social Sciences	Emeritus faculty, faculty, Graduate Students, Postdocs
10	Library provided services: catalog, databases, reference, ILL	Humanities, life sciences, physical science, social sciences	Emeritus faculty, faculty, Graduate Students, Postdocs
6	Google, Google Scholar	Physical science	Faculty, Graduate Students, Postdocs
3	Publishers' websites, personal subscriptions and purchased articles	Physical science, science	Faculty
2	Preprint services, e.g., arXiv	Physical science, social science	Faculty, graduate student

frequently not accessible there, and another saying that ResearchGate works well. There also seems to be a preference among the researchers we interviewed to reach out to someone they know (a colleague or author), rather than contacting a total stranger, but whether that is because the success rate is higher, or they are just more comfortable requesting access from someone in their professional network is unknown (and not a question we asked).

RQ3: What does timeliness mean in different research contexts?

Most of the interviewees who have obtained materials via ILL do not complain about the time it takes to fulfill their request. On the contrary, most report that delivery is quick. There are exceptions, though, in situations where speed is of the essence. One patron, who was responding to a "revise-and-resubmit" request, for instance, reported that she cannot wait for materials to be delivered via ILL, no matter how quickly the requests get fulfilled. Another faculty member reported that he has only one month to write up his summer research. He therefore has no choice but to buy the books that the Library does not own. Over a thirty-year timespan, this has added up to a sizable collection. He has also found himself, at times, looking for additional timeslots in his schedule to complete preparations for a course because he had to wait for one or more articles to come in via ILL.

> *It's very often when you're preparing to give a lecture . . . or more typically if you're under a deadline of some sort to return something . . . . Of course, the world can wait forty-eight hours, usually, but it does seem to greatly delay the whole process because you put that off and then by the time you come back to it, other things have come along*. (Faculty member in the Humanities)

One other faculty member expressed concerns that students working last-minute will not have time to wait for an item to be delivered through ILL. She added that for most of them, ILL presents an insurmountable hurdle in any case.

RQ4: Is change in access impacting where researchers are publishing?

We were interested first and foremost in the impact of the 2019 cancelations on Cornell users' access to content needed for their research and how they navigate access. But our study group was also interested

in registering any impacts Library subscription decisions might be having on Cornell authors' decisions about where to place their own research. Our interview protocol included these questions:

- Has the fact that the Library does not subscribe to some journals or has canceled some journals made you change your mind about where to publish your research?
- Has it affected other decisions in your teaching or research?
- Why do you think that is?

Most participants indicated no direct association between whether the Library provides subscription access to a journal and where they publish. A common response was that they aim to publish in the primary or top-tier journals in their fields, and that they know which those are. Other participants told us they regularly publish in one or a limited set of journals, and do not consider immediate access as a factor. However, five interviewees expressed a reluctance to publish in journals that are not available at Cornell University. Their concern relates to the broad dissemination of their research and similar sentiments were expressed at extreme ends of the career continuum:

> *The fact that there's a barrier here at Cornell suggests that there is a general barrier to dissemination of that particular journal. It reflects negatively on the journal in terms of whether the work is going to get disseminated broadly or not.* (Emeritus faculty member in the Social Sciences)

> *You want to publish in a journal that is widely accessible. Cornell is a big place and doesn't have access to these papers, so you may think, "OK, maybe it's better to go with another journal that people at Cornell can read."* (former post-doc in the Physical Sciences)

One interviewee said that while her own publishing decisions are not affected by whether the Library provides subscription access, access to "second- and third-tier journals" (i.e., the ones she imagines are likely to be canceled first) serves an important function in guiding graduate students' publishing decisions:

> *Grad students need to learn how to publish . . . and it's very good to practice on lower-end journals. . . . So, if Cornell doesn't subscribe to second- and third-tier journals, you're denying our grad students the opportunity to learn the game of journal article writing*. (Faculty member in the Social Sciences)

For several of the participants, discussion of publishing, access, and the visibility of research steered the conversation to open access and the affordability of open access options for authors. These researchers want others to be able to see their work. If their grant funding is no longer available, or the charge for OA is too high, or if the journal does not offer any OA option, the research is not available to everyone.

Discussion

We have seen Cornell's turnaway figures for non-subscribed titles grow from year to year, but at a significantly lower rate than the annual growth of inaccessible articles in those journal titles. It

is difficult to know the presumably multifactorial causes of the patterns of journal use and thus challenging to make predictions. Yet if most journal usage is concentrated on the most recent five years of publication, as the literature review suggests, it seems likely that after we reach five years of inaccessible content, the turnaway numbers will plateau because the number of inaccessible articles that are newer than six years old will remain more or less steady. This would be an extension, beyond 2022, of the timeframe represented in figure 2.

We note that non-subscribed content is less likely than subscribed content to show up in our managed discovery tools, which is likely one factor in the low turnaway and ILL counts compared to historical usage. Users can readily choose whether or not to see results that are not held by the Library in these tools, although many are discovering content in tools that are not managed by the Library, such as Google Scholar, where the system is not likely to filter out results from our non-subscribed content. The most significant changes made to our discovery tools since cancelation of the publisher package to facilitate access to some unsubscribed content were the addition of a DOI lookup functionality to our Illiad ILL form and including a link to the UnPaywall service on our OpenURL resolver. Both of these services can direct users to open access versions of articles, where available.

We have observed different post-cancelation impacts and user behavior from discipline to discipline, but we note that the patterns we are seeing might be specific to the particular publisher under consideration. A different picture might emerge in the case of a publisher with different disciplinary strengths.

Following Nabe and Fowler, we compared pre-cancelation usage and ILL statistics for canceled journals with and without ILL requests during our 2019–2022 study period and found some striking differences between our universities. At Southern Illinois University-Carbondale (SIUC), where the Nabe and Fowler study took place, 47 percent (283) out of 597 canceled journals showed zero ILL requests, despite 2,361 downloads for these journals in the year prior to cancelation. At Cornell 77 percent (654) out of 853 canceled journals showed zero ILL requests, despite 44,875 downloads in the previous year. For these journals the average pre-cancelation usage was eight per journal at SIUC and 69 per journal at Cornell.

At SIUC 1,118 ILL requests were made for 53 percent (314) of 597 canceled journals during their five-year study period. At Cornell 415 ILL requests were placed for only 23 percent (199) of the 853 canceled journals over our four-year study period. The pre-cancelation usage for these journals with ILL requests amounted to 36 and 106, on average, per journal per year (11,254 and 20,998 uses), respectively. While at Cornell, the pre-cancelation usage for canceled journals that received ILL requests was roughly triple the analogous usage at SIUC, the total number of ILL requests per canceled journal that received such requests comes to 2.1 for Cornell versus 2.8 for SIUC (where figures for the latter are prorated to match our four-year study period). Cornell's ILL figures may be somewhat artificially low in relation to both historical usage and post-cancelation turnaway rates because these latter two measures include the activity of users from Cornell's Weill Medical College, while our ILL counts do not. Still, considering the demographics (the population of students and academic staff affiliated with Cornell's Ithaca campus is

roughly seventeen times that of Weill Medical), this is unlikely to be a decisive factor. It may be that the breadth and depth of Cornell's collection as a whole has provided enough alternatives to the canceled content to satisfy much of the need. It may also be that our decisions about which journals to maintain and which to drop were largely on the mark. Availability of various alternative avenues for gaining access to unsubscribed journal content is no doubt part of the picture as well.

These comparisons show that even when the cancelations pertain to the same publisher, as is the case here, the demand for ILL services can be very different. A likely factor affecting this demand is the quality (e.g., impact factor) of the affected journals.

One thing that seems clear to us from both the usage counts and our conversations with researchers is that ILL is an underutilized Library service at Cornell. The University's decentralization, its exceptionally broad disciplinary span, the heterogeneity of department and disciplinary cultures across the institution all pose challenges to unified communication about Library services and influence their uptake; all of this may play into the low ILL use. Our sample of Cornell researchers made clear that they were more likely to ask a colleague at a subscribing institution for a copy of the article they need—or to ask the author—than to use ILL. This suggests a need to improve both our communication around ILL and pathways we offer to patrons to access the service.

From our sample of researchers, it also became clear that our patrons, even those selected for their close relationship with journals from the publisher in question, do not necessarily associate journals with a particular publisher. Since our communication with researchers around cancelations, etc., has often focused on publisher, this is an important insight for us that will inform our future communication approaches.

Finally, the relationship we have seen over nearly five years between historical usage and turnaways, as well as flux we see in the turnaway counts, reinforce our preference to license for flexibility. Our experience over the past few years at Cornell suggests that, while we can continue to improve our services, at least for one large, commercial publisher, we can provide timely access to the material our researchers need most without licensing the full range of journal offerings. Continuing to watch the patterns of use and attempted use, negotiating for licensing that allows us to swap titles in the package contract year by contract year, and keeping up robust conversations with our researchers puts us in a strong position and offers lessons for future negotiations.

Limitations

We recognize that the findings of our study are not necessarily generalizable to other institutions or to other publishers, especially in light of differences in disciplinary profile from publisher to publisher and divergent practices for working with the journal literature from discipline to discipline. Moreover, our study's timeframe is limited and marked by the events of the global pandemic, which affected work habits and other modes of operation in ways that are difficult to understand.

Conclusions

Our study investigated Cornell University user responses to cancelation of a subset of journals from one large publisher. Despite the limitations described above, our research offers at least partial and tentative answers to our initial research question, the one that first sparked our interest in Cornell's experience with the 2019 changes to our journal package as a possible object of extended study (RQ1): What explains the differences between historical usage, current turnaway attempts, and follow-through to ILL requests?

We learned that intensity of user attempts to access journal content after cancelation varies by academic subject domain, variances that show up in turnaway data as well as ILL requests. The reasons for these differences still elude us and require further investigation. Our interviews with "super-users" of the canceled journals (those who had recently published in them, cited them, or requested them via ILL) clearly indicate that, while library-mediated access to non-subscribed content is widely used, this cohort relies above all on their personal and professional academic networks to provide articles that are not immediately available via library subscription. At the same time, the interviewees did not, for the most part, emphasize specific associations with the canceled titles; the behaviors and workflows they described were offered as applying generally to their research in the journal literature. Perhaps the fact that we did not hear strong advocacy for specific titles can be taken as validation of the Library's method for choosing what to leave out of the subscription list after exiting the big deal-style package: cost per use calculation, modified by librarians' subject knowledge, with a few ex post facto adjustments based on faculty response. For the journals to which the Library no longer provides immediate access, even "super-users" of these titles seem able to get the content they need without significantly impeding their work.

Notes

1. To avoid readers' prior associations with the publisher and keep to the focus on Cornell's model, methodology, and conclusions that we hope are generalizable, to some extent, we have chosen not to name the publisher in this article. The information is not confidential, and the publisher has been named by the Library in other public settings.
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17. Carol Tenopir et al., "No Scholar Is an Island: The Impact of Sharing in the Work Life of Scholars," *Learned Publishing* 30, no. 1 (2017): 5–17, https://doi.org/10.1002/leap.1090.
18. Tenopir et al., "No Scholar Is an Island," 6.
19. Tenopir et al., 8–9.
20. Tenopir et al., 15.
21. Tenopir et al., 6.
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23. Walters, "Beg, Borrow, and Steal," 5.
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33. Nash and McElfresh, 298; cited in Smith, "Living in Denial," 32.
34. Adelia Grabowsky et al., "Journal Packages: Another Look at Predicting Use," *Collection Management* 45, no. 1 (2020): 57–70, https://doi.org/10.1080/01462679.2019.1607643
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36. Our method is biased toward eliminating false positives. Therefore, there is a possibility that we missed some transactions where the title input into ILLiad was close enough for staff to recognize the title and complete the transaction when they were assisting patrons, but not exactly the same as the journal title string that we have in our study dataset. If our data includes examples of this, the numbers are small.
37. See appendix 1 for the interview protocol.
38. In appendix 2 we describe how we filtered out turnaways associated with articles published before our backfiles and subscriptions started (mostly 1997).
39. LCC classes not included in the plot have either no or too few canceled journals in them to warrant inclusion in our analysis.
40. More detail on our findings about turnaway and ILL rates, the change over time, and the differentiation by subject is included in the appendix. See figures A.1, A.2, A.3, A.4, and A.5.

Appendix 1. Interview Protocol

Questions

1. Please tell us your name, position (asst. prof., lecturer, senior researcher, graduate student, etc.), field of study/research and/or areas of research interest.
2. Please tell us about a project that you are working on now or that you worked on recently (could be preparing for a class/course, writing a grant, lab research, doing research for a book, etc.).
3. Recently, the Library stepped away from our previous journals package with the [publisher name] and reduced the number of [publisher name] journals to which we subscribe. Titles such as *[title of journal]*. Do you remember using this journal or other in the last couple of years? Did you have any trouble getting the articles you wanted in those journals from the library?
4. Do you recall using articles from any journal—from any publisher—that you couldn't get through the library, not even via ILL?

   [If yes:] Do you remember the title of the journal? Is that a journal that we used to subscribe to? *[Then go to Q5.]*

   [If no:] That's terrific! What steps would you take if you needed something we didn't have? Or maybe you worked at another institution where you encountered this? *[Modify Q5 for hypothetical.]*

5. I wonder if you could share with us the process you took when the article/source you needed was unavailable via the CU library. What did you do?
6. In the context of searching for resources, how do you browse through issues to discover items of interest? Do you focus on keywords or the abstract, the title or something else?
7. Has the fact that the library does not subscribe to some journals or has canceled some journals made you change your mind about where to publish your research? Has it affected other decisions in your teaching or research? Why do you think that is?
8. If you had $10,000 dollars to allocate for purchases in the library, where would you put your money? It could be anything—spaces, services, subscriptions, etc. Don't worry too much about real-world pricing if you don't have a sense of the costs—just use your imagination.
9. Any additional thoughts or comments that you would like to tell us about how the library could help you?

Thank you very much for your time.

Appendix 2. Additional Data Analysis

Here we examine on the level of LC class how the precancelation usage for the 853 titles canceled in 2019 resulted in turnaways and ILL requests. Before we can do so, we need to discuss one important assumption we made in deriving the turnaway numbers shown in table 1 and in figures 1, 2, A2, and A5. By design the COUNTER-compliant turnaway reports provided by the publisher do not separate turnaways by publication year. This means that the turnaway reports for 2019 through 2022 contain turnaways also for articles published before our backfiles and subscriptions started (mostly 1997). To be able to study the evolution of purely post-cancelation turnaways, we need to subtract the turnaways for older content. For this we use the COUNTER-compliant turnaway report for 2018 (the year before our cancelations went into effect) in which a total of 2,670 turnaways were recorded. As can be seen in figure A1, the 2018 turnaways were much lower than those for subsequent years: only 30% of the 8,828 turnaways recorded in 2019 and 15% of the turnaways in 2022. Figures 1, 2, A2, and A5, and table 1 all are based on these subtracted counts.

In figure A2, we have normalized the data for each LC class to the average usage over 2016–2017. This makes it easier to look for differences in the evolution of precancelation usage into turnaways for publication years 2019–2022. Clear differences can be seen in the demand for post-cancelation articles. For classes S (Agriculture) and T (Technology),

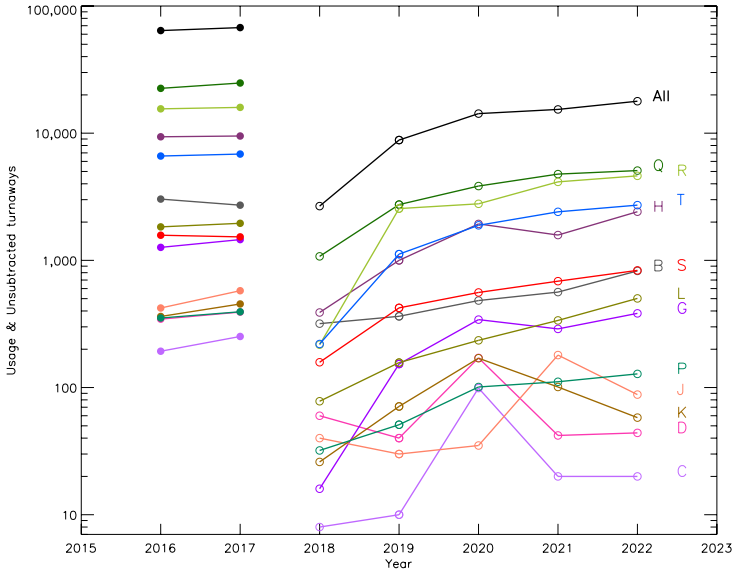

Figure A1. Pre-cancelation usage in 2016–2017 for the titles canceled in 2019 (filled circles) compared to the combined turnaway statistics in 2018–2022 for articles published before 1997 and for journals canceled in 2019 (open circles).

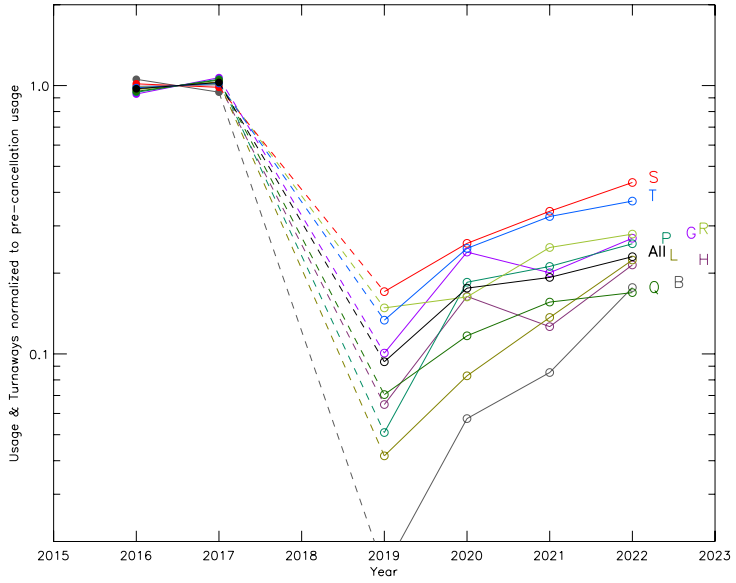

Figure A2. Same data as in figure 2 but scaled by the average pre-cancelation usage for each LC class. The steeper the slope of the post-cancelation turnaways the faster the turnaways are increasing.

the Cornell data shows a higher ratio of turnaways relative to the pre-cancelation usage than, for example, for classes B (Philosophy, Psychology, and Religion) and Q (Science). In fact, for LC class S, the demand for post-cancelation articles had climbed to 44% of the pre-cancelation usage by 2022, whereas for class Q this number is closer to 17%. Overall (black curve labelled "All") in 2022 the demand for post-cancelation articles is 23% and rising.

As can be seen in figures A3 and A4 the lack of access to the post-cancelation content has not resulted in large numbers of ILL requests. In fact, after an initial tripling from 2019 to 2020 the number of ILL requests has since gone down, despite a quadrupling of post-cancelation content over the same period.

Normalizing the pre-cancelation usage to unity for all classes (figure A4) makes it possible to see for which LC class the ILL requests are high relative to the pre-cancelation usage: class S (Agriculture) with 0.7% in 2022. Relatively few ILL requests are placed for classes Q (Science), R (Medicine), and T (Technology): in 2022 for just over 0.1% of the pre-cancelation article usage.

Note that the class with the highest demand for ILL fulfillment relative to precancelation usage, class S, also has the highest level of turnaways relative to precancelation usage. While both these rankings could

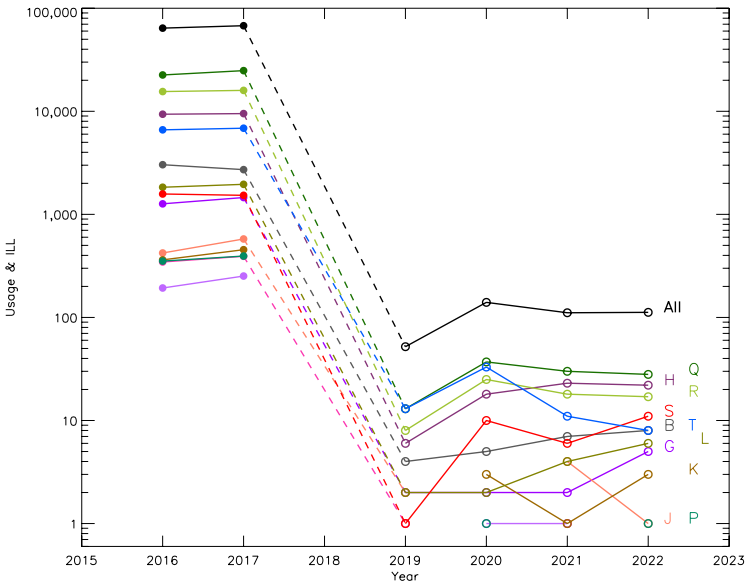

Figure A3. Pre-cancelation usage in 2016–2017 for the titles canceled in 2019 (filled circles) compared to the ILL requests for articles published in 2019–2022 (open circles).

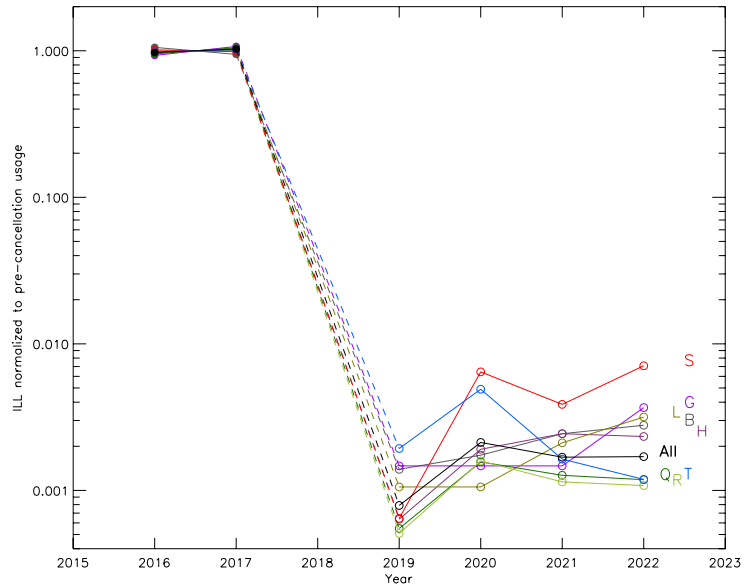

Figure A4. Evolution of ILL requests between 2019 and 2022 for articles published in canceled journals. The curves for the various LC classes have all been scaled to their average pre-cancelation usage over 2016 and 2017.

indicate higher demand at Cornell for the content in canceled class S journals than other journals canceled in other areas, the fraction of turnaways for class S resulting in ILL requests is still unremarkable: a mere 1.5%. This is best seen in figure A5, which compares average 2019–2022 turnaways to average 2019–2022 ILL requests for all LC classes with significant numbers of journals per class. The figure further shows that, averaged by class, the number of ILL requests ranges between 0.5% and 4% of turnaways, with the fraction being lower for classes with high numbers of turnaways per year (0.5–1%) than classes with low numbers of turnaways per year (1%–4%).

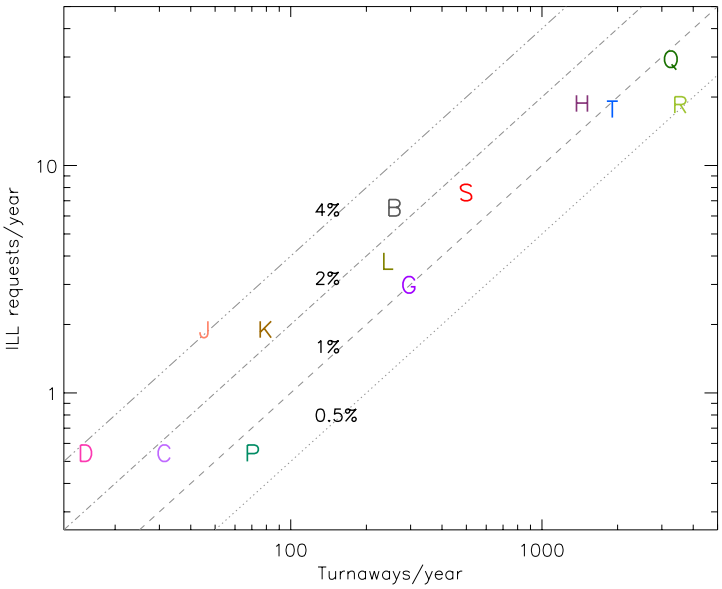

Figure A5. Average turn-aways per year versus average ILL requests per year for various LC classes. The number of ILL requests ranges between 0.5% and 4% of turn-aways.

FEATURE

RDA in the Ghanaian Academic Library Cataloging Community

Awareness, Competencies, and Implications

Eugene Baah Yeboah, Maned A. Mhlongo, Omwoyo Bosire Onyancha

This study investigated the awareness and competencies of Ghanaian cataloging practitioners and stakeholders regarding Resource Description and Access (RDA), a little over a decade after the standard was rolled out. Survey and interviews were combined to examine the entrenchment of the RDA standard in Ghana from the viewpoint of sixty-two cataloging managers and staff in selected academic libraries. The data analyzed though descriptive statistics and thematic content analysis revealed that while 82 percent of cataloging practitioners were aware of the RDA standard, knowledge and mastery of the RDA guidelines and application of the standard was established to be low and quite basic. Fellow catalogers within libraries, attendance at local conferences, and personal research emerged as major sources of RDA awareness. It was concluded that awareness of the RDA standard will not lead to widespread adoption and implementation of the standard.

We are experiencing an explosion of information and increased competition in the information space, with libraries particularly striving towards effectively and satisfactorily serving users. In this current digital age, the essence and contribution of information resource organization is more pronounced to attaining this mandate. Atilgan, Özel, and Çakmak submit that the prevailing information environment, influenced significantly by developments in technology, has contributed to the changes witnessed in the principles, instructions, and standards governing information organization, particularly cataloging and the creation of catalogs.[1] There is a shift from the mere description of information resources to the description of information resources in a manner that shows a relationship with other resources, as well as the integration of these descriptions to various information systems in the linked-data environment.

To successfully achieve this mandate, standardization is crucial.[2] Krasteva maintains that evidence across the globe points to the contribution of standardization in facilitating exchange and trade, managing economies, protecting healthy livelihoods of the masses, achieving community goals, and safeguarding the environment.[3] In the library space specifically, standardization is especially relevant in its application in areas such as international standard numbers, compilation of bibliographic descriptions, preservation of electronic documents and resources, and the assurance of service quality in libraries often expressed through service quality (SERVQUAL) and library quality (LIBQUAL).

Eugene Baah Yeboah (eugene.yeboah@ucc.edu.gh), Doctor of Information Science and Head of Cataloging, Sam Jonah Library, University of Cape Coast. **Maned A. Mhlongo** (maned.mhlongo @gmail.com), Associate Professor at the Department of Information Science, University of South Africa. **Omwoyo Bosire Onyancha** (onyanob@unisa.ac.za), Research Professor, Department of Information Science, University of South Africa.

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Although standardization of bibliographic frameworks is crucial for bibliographic description for varied reasons, equally or, perhaps, more significant is the need to standardize the set of rules guiding the entire activity of bibliographic description. The effort towards codifying and standardizing the rules for cataloging information resources commenced in the nineteenth century. Denton observes that although there are very few similarities between the cataloging practices of the early nineteenth century and these contemporary times, there is ample evidence to suggest that the practitioners of the former era were executing a system.[4]

The change from the Anglo American Cataloging Rules second edition (AACR2) standard to the current Resource Description and Access (RDA) standard was occasioned by the inability of the former to effectively provide guidance in as far as the bibliographic description of contemporary information resources is concerned.[5] As Ahonsi contends, the difficulties faced by the AACR2 standard began around the mid-1990s and coincided with the emergence of information resources in various technology enabled formats.[6] Also contributing to the inadequacies of the AACR2 were the emergence of contemporary principles in bibliographic description such as the Functional Requirements for Bibliographic Records (FRBR) in 1998 and the International Cataloging Principles in 2009.

Ghana's library space is made up of the national library as well as academic, special, public, and school libraries. Public academic libraries found in higher educational institutions, however, represent the most resourced of all libraries in Ghana with extensive services and operations thereby making them a prime candidate for a study of this nature. The Ghana Library Association is the professional body for librarians in Ghana, irrespective of the type of library they work in. There are other networks, consortia, and committees in the Ghanaian library space with different mandates and focus. The current cataloging standard of RDA, though approaching the first decade since its inception, has yet to witness widespread adoption and implementation in Ghanaian academic libraries owing to varied reasons. These reasons, be they financial, logistical, or human related, are driving an unfortunate trend, where libraries in Ghana, irrespective of their type and form, are relying on the provisions of AACR2 instead of RDA.

Statement of the Problem

The provisions of AACR2 have formed the basis for the cataloging practice in Ghana since its introduction in the operations of libraries. The leverage afforded by this cataloging standard, in terms of uniformity of practice and resource sharing, is not lost to academic libraries in Ghana, as they have considered and accommodated the various revisions that AACR2 underwent in their operations. As such, one expects that academic libraries in Ghana knowing fully the significance of current cataloging standards, would have taken steps to adopt and implement the provisions of RDA immediately. A decade after the rolling out of RDA as the new cataloging standard, however, this is yet to happen, owing to varied reasons such as the perceived similarity in the fundamentals of the two standards, the expensive nature of the RDA Toolkit, lack of RDA expertise, and the perception that AACR2 still meets libraries' cataloging needs. A deliberate systematic review of MARC records in the Online Public Access

Catalogs (OPACs) of most Ghanaian academic libraries by the researchers has revealed the reliance on the provisions of the AACR2 standard.[7]

Since the completion of the US RDA Test and the subsequent full roll out of the standard a decade ago,[8] the conversation surrounding the adoption and implementation of RDA in Ghana has been a rather muted one. An apparent gap exists in terms of literature of Ghanaian origin on the RDA standard, as presently, only a couple of scientific research studies on RDA of Ghanaian origin exist. This present state of affairs has contributed to the relatively limited uptake of the RDA standard in Ghana, as the required scholarly communication and scientific outputs needed to engender conversations and initiatives among key stakeholders and constituencies are clearly non-existent. To stimulate the success of the RDA standard in Ghana, this trend ought to be challenged as evidenced in countries such as South Africa and Nigeria, where the availability of RDA literature has contributed to the relative success of the standard.[9]

This paper investigates the extent of awareness and knowledge of the RDA standard among cataloging professionals and librarians in Ghanaian academic libraries and the concomitant implications for the country's bibliographic description and control.

Objectives of the Study

The objectives of this study are as follows:

1. To determine the level of awareness of the RDA standard among cataloging librarians in Ghanaian academic libraries.
2. To ascertain the most influential sources of RDA awareness among cataloging librarians in academic libraries in Ghana.
3. To determine the level of knowledge of the RDA standard among cataloging librarians in Ghanaian academic libraries.
4. To determine the possible implications of the awareness and knowledge of RDA.

Literature Review

In her 2014 handbook that sought to facilitate the appreciation of RDA provisions by cataloging librarians in English speaking nations in Africa south of the Sahara, Ahonsi found that awareness of the existence of the RDA standard—rather than the understanding of the standard—was pervasive among catalogers and librarians across the African continent.

In a study that sought to survey the perspectives of librarians in university libraries located within the northwestern enclave of Nigeria, Haliru, Sokari, and Bello found a relatively low (40 percent) awareness of the RDA standard among all librarians.[10] In a similar study assessing the extent of RDA implementation in Nigeria, Aboyade and Eluwole and Saliu, found that about 94 percent and 70 percent of all librarians respectively, were either very much aware or partially aware of the existence of RDA, with only 6 percent affirming their ignorance of the new standard.[11] Aboyade and Eluwole revealed

professional journals, colleague catalogers from work and other libraries, library association websites, local and international conferences, and web presentations, as some of the sources from whence the catalogers were informed about RDA.[12]

The adoption and implementation of RDA across the globe is facilitated differently by individual libraries and other institutional stakeholders in the library space. Acedera earmarks the Philippine Professional Regulatory Board for Librarians (PRBFL) as the body responsible for facilitating the standard's implementation in the Philippines.[13] The author avers that 78 percent of the respondents were aware of the resolution of the PRBFL to adopt RDA as the cataloging standard for the country, but were not aware of when their libraries intended implementing the standard. In a similar vein, Oliver identifies the contribution of the Canadian Committee of Cataloging (CCC) in raising awareness of the standard and playing an active role in educating and informing the Canadian cataloging community of the developments, changes, and presentations of the RDA standard.[14]

On an individual level, several studies detail the various initiatives that brought the standard to the notice of individual librarians. In a study of the RDA standard at the University of Kansas library, Kottman found that cataloging staff were largely aware of RDA and kept themselves apprised of developments in the standard, as well as its implementation through participation in webinars, studies of past presentations, and e-mail listservs from the Online Computer Library Center (OCLC).[15] In a study in Malaysia on the perception of cataloging librarians about the RDA standard, Mansor and Ramdzan found that an overwhelming 95 percent of the respondents were aware of the RDA standard and identified the web, in general, as well as training workshops, conference presentations, journal articles, and formal education at library schools as some of the sources from whence they learned about RDA.[16] In a study undertaken to ascertain the conception, outlook and potential of the implementation of the RDA standard in Turkey, Atilgan, Özel, and Çakmak found that catalogers in the country were generally in the know about the terminologies, guidelines and structure of the standard.[17] In a separate study, Atilgan, Özel, and Çakmak again found that awareness and appreciation of the RDA standard in Turkey was created among librarians and catalogers through workshops and working groups, while understanding of the standard was undertaken on a library-by-library basis.[18] Haliru, Sokari, and Bello highlighted the significance of creating awareness of the standard but cautioned that awareness is not an end in itself and should be regarded as the first step in the process of adopting RDA.[19]

There are a plethora of sources from which RDA awareness originates. Ascertaining which sources have had a significant impact on RDA awareness and knowledge propagation, however, is not addressed extensively in literature on this topic globally. Where literature that originates from high-income countries would show the relative popularity and impact of institution-backed sources such as workshops, working groups, webinars, email listservs, and conferences,[20] individualistic sources such as personal research, colleague catalogers from both within and outside their libraries, and professional journals have been identified to be more popular and impactful sources of RDA awareness and knowledge propagation in low-income countries.[21]

Being aware of the RDA standard, however, is distinct from being knowledgeable in its usage. For the RDA standard to witness widespread adoption and usage in academic libraries, both awareness of the standard—by management and all librarians—as well as knowledge of the standard—by cataloging librarians—are imperative. Oguntayo and Adeleke similarly surmise that knowledge of the RDA standard must transcend the mere awareness of the standard and they assert that slow implementation of the standard in Nigerian libraries was a consequence of the absence of the requisite knowledge of the standard by catalogers and librarians.[22] The authors also place the blame for the inadequate knowledge of the current standard partly on the reluctance of library schools to teach the RDA standard in their cataloging curricula.

Ifijeh, Segun-Adeniran, and Igbinola have observed that, although libraries in Nigeria and most developing countries across the African continent have been aware of the RDA standard since its implementation in 2013, the inadequate knowledge of the standard has contributed significantly to the slow progress in implementing RDA in libraries. They therefore recommend a holistic approach towards raising awareness of RDA and suggest that this should be concurrent with fostering an understanding of the RDA standard.[23]

Similarly, Oguntayo and Adeleke assert that awareness of the existence of the new standard is significant; however, knowledge of the workings of the standard was basic and appears to concentrate on subject matters revolving around a general introduction and the development process of the RDA standard.[24]

Research Methodology

The study's research objectives required both quantitative and qualitative data from cataloging staff at the operational level and library management at the policy level. The need to bring together both quantitative and qualitative data in this research study was to foster a better understanding of the underlying issues; thus, the mixed methods research approach was deemed appropriate. A survey was used for the quantitative phase of the study, while an interview was engaged for the qualitative phase.

The population of this study included all academic library staff engaged in the practice of cataloging and classification at the policy and decision-making level. These respondents have the authority to make decisions pertaining to their resource description and organization practices. The category included university librarians, head catalogers, and deputy head catalogers of the nine academic libraries in Ghana selected for this study. Completing the population for the study were the catalogers (staff of the cataloging units) of the nine entities involved in the practice at the operational level, as well as library staff who carry out cataloging activities in departmental and college libraries under the auspices of these academic library systems. The nine public academic libraries domiciled in nine public universities—University of Ghana (UG); Kwame Nkrumah University of Science and Technology (KNUST); University of Cape Coast (UCC); University of Professional Studies, Accra (UPSA); University of Education, Winneba (UEW); University of Development Studies (UDS); University of Mines and Technology (UMaT); University of Health and Allied Sciences (UHAS) and University of Energy &

Natural Resources (UENR)—were sampled on the basis of having an established cataloging department or unit undertaking the activity in house for at least five years. This benchmark eliminated technical university libraries and relatively new public academic libraries from the study. The population of the study is presented in the table below.

As shown in table 1, the population of the study encompassed nine university librarians, nine head catalogers, and six deputy head catalogers from the nine academic libraries. This brought the participants at the policy level to twenty-four. Equally important to the study were the staff in the cataloging departments of these academic libraries, who practice the activity on a daily basis. Table

Table 1. Population of respondents at policy and operational levels for the study

Study Sites	Respondents at the Policy Level			Total Staff at Policy level	Total Staff at Operational level	TOTAL
	University Librarians	Head Catalogers	Deputy Head Catalogers			
UG	1	1	1	3	10	13
KNUST	1	1	1	3	9	12
UCC	1	1	1	3	15	18
UPSA	1	1	-	2	2	4
UEW	1	1	1	3	7	10
UDS	1	1	1	3	5	8
UMaT	1	1	-	2	2	4
UHAS	1	1	1	3	5	8
UENR	1	1	-	2	1	3
TOTAL	9	9	6	24	56	80

Source: Authors' construct (2024)

1 column six shows the number of staff members that UG, KNUST, UCC, UPSA, UEW, UDS, UMaT, UHAS and UENR academic libraries engage in their cataloging practice, respectively. This brings the number of respondents at the operational level to fifty-six. In all, the population of the study (eighty) equals the number of respondents, at both the policy and decision-making level (twenty-four), and the operational level (fifty-six).

The manageable population size of eighty and the need for the views and perspectives of both categories of subjects towards the achievement of the research objectives suggested the census technique, in which all subjects were eligible for the study.

In the quantitative phase of the study, questionnaires were used to elicit data from the cataloging staff at the operational level, who were recruited through the assistance of the respective head catalogers and university librarians. Interviews were used in the qualitative phase of the study to elicit data from staff at the policy-making level. Out of the fifty-six questionnaires distributed, forty-five of them were returned and deemed usable thereby providing a response rate of 80.4 percent at the quantitative

phase. At the qualitative phase, out of the twenty-four potential interviewees, seventeen availed themselves for the exercise producing a response rate of 70.8 percent at the qualitative phase.

The study as part of a broader doctoral study, followed strict ethical guidelines right from attaining an ethical clearance from the College of Human Sciences Research Ethics Review Committee of the University of South Africa and permission letters from the Institutional Review Boards of the nine aforementioned public university libraries, to the reporting of data. The ethics review undertaken by the aforementioned bodies was for low-risk research with human participants. Survey respondents were voluntarily recruited to partake in the study by answering the questionnaire that was electronic in format. Although heads of cataloging units helped identify potential respondents, there was no coercion for their participation in the study. Voluntary participation promoted the anonymity of respondents throughout the study. The introductory part of the survey tool and interview guide afforded respondents and interview participants the opportunity to provide their informed consent before proceeding to take the survey. Respondents were also apprised on how their demographic data and responses would be used in the study.

Results

This section presents the findings according to the objectives of the study under headings such as respondents' and interviewees' demographics, level of awareness of RDA, popular and influential sources of RDA, level of knowledge of RDA, and implications.

Respondent and Interviewee Demographics

With respect to the education of respondents, twenty-two (49 percent) had a master's degree. Those with a bachelors' degree accounted for nineteen (42.2 percent) of the respondents and a minority of the respondents, two (4.4 percent) had doctorate degrees and two (4.4 percent) held Higher National Diploma/Diplomas as their highest academic qualification.

Table 2 shows that the majority of the respondents (sixteen, 35.6 percent) are in their first two years of service in the cataloging department, fifteen (33.3 percent) have three to five years of experience in cataloging, nine (20 percent) have six to ten years of cataloging experience, three (6.7 percent) have eleven to fifteen years of cataloging experience, while two (4.4 percent) staff members have sixteen or more years of service in the cataloging department. The data shows a fair amount of cataloging experience in the cataloging units of Ghanaian academic libraries with as much as 64.4 percent of the cataloging staff having more than three years' experience in cataloging.

Seventeen interviewees, designated from CAT 1 to CAT 17, in varied capacities such as university librarians, head catalogers and deputy head catalogers, participated in the interview session.

Level of Awareness of RDA among Cataloging Staff in Ghanaian Academic Libraries

As the first objective of the study shows, questions were posed to the respondents on the level of awareness of the RDA standard among cataloging staff. The study found that the majority of the respondents, thirty-seven (82 percent), were aware of the standard, while the remaining eight (18 percent) of survey respondents across the nine study sites indicated that they were not aware of RDA. These eight respondents were scattered across five study sites and were found to have less than two years of experience in cataloging.

Interviewees were all very much aware of the standard though their engagement with it varied.

> *I am aware of RDA as the successor to AACR2, although I cannot remember exactly when I first became aware of it.* (CAT 2)

> *I have been aware of RDA for quite some time now, although I hardly use the standard.* (CAT 3)

> *My awareness of the RDA standard is quite low to be honest, though I occasionally hear of it.* (CAT 12)

Table 2. Cataloging staff at operational level (*N* = 45)

Gender	***n***	**%**
Male	19	42
Female	26	58
Age		
21–40	6	13
31–40	26	58
41–50	12	27
51–60	1	2
Level of Education		
Doctorate degree	2	4
Master's degree	22	49
Bachelor's degree	19	43
HND/Diploma	2	4
Years Working in the Cataloging Unit, Section, or Department		
0–2 years	16	36
3–5 years	15	33
6–10 years	9	20
11–15 years	3	7
16 years and above	2	4

Source: Authors' construct (2024)

Popular Sources of Awareness of RDA for Respondents and Interviewees

Having established that a significant percentage of the survey respondents (82 percent) and interviewees (100 percent) were aware of the RDA standard, it was deemed imperative to unearth the sources from where they first encountered RDA as a cataloging standard. Fellow catalogers within respondents' libraries emerged as the foremost source of RDA awareness according to the majority of the respondents, twenty-five (56 percent). This means that catalogers, who might have heard or learned about cataloging from various institutions, seminars or training, had an influence on other catalogers and librarians as far as RDA as a cataloging standard is concerned. In addition, attendance at local conferences, workshops, or seminars and personal research each emerged as notable sources of RDA awareness among eighteen (40 percent) of the survey respondents respectively. The least frequently

cited source of awareness of RDA was through webinars, with only two (4.5 percent) respondents indicating this as a source. The data on the source of awareness of RDA among cataloging staff is illustrated in figure 1.

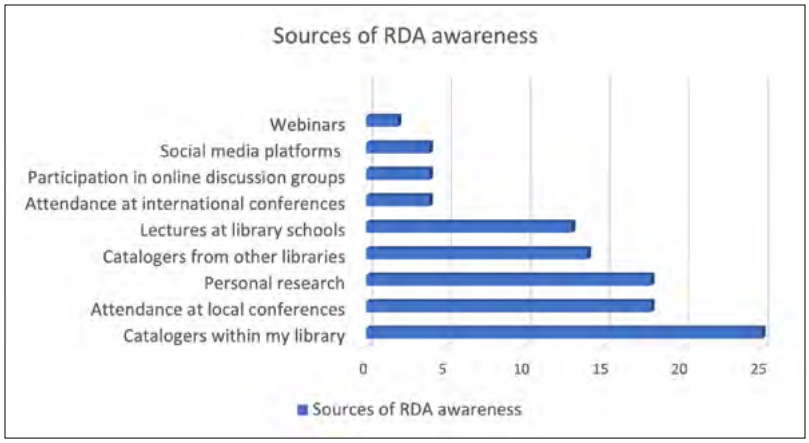

Figure 1. Sources of RDA awareness

From the perspective of interviewees, the sources of their RDA awareness were established to be personal and, in some instances, institutional. Some of these interviewees alluded to the involvement of stakeholders in Ghana's library and information space in the creation of awareness of the standard, while others indicated the contribution and initiatives of their library management towards RDA awareness creation.

> *I cannot recall exactly the moment I first heard or read about RDA, but I do recall clearly a workshop I attended in 2012, under the auspices of CARLIGH, where RDA was first introduced to Ghanaian catalogers. The training was quite helpful unfortunately, since then, I have not heard about any such program in Ghana's information space.* (CAT 1)

> *I am quite aware of the RDA standard. I have heard about it in passing in some training programs and also through my own personal studies and research.* (CAT 5)

> *My first encounter with RDA was during its early years, when I was nominated to represent my library in an RDA cataloging workshop organized at the University of Ghana between 11th to 13th April, 2012. The workshop was organized by CARLIGH and funded by the International Network for Advancing Science and Policy (INASP).* (CAT 9)

> *I got to know about RDA quite recently through a colleague in a different library in passing.* (CAT 13)

These participants, as policy and decision makers in the university library systems under consideration in this study, averred that little effort is being made by their library management teams to create awareness for the RDA standard.

> *The subject of RDA has been raised at our management meeting before, but we are yet to roll out any program to create awareness about the standard among our catalogers.* (CAT 5)

> *Within the confinement of our library, I can say no official effort has been made or currently underway to create awareness about RDA. On an unofficial note, the quite experienced catalogers around do educate other cataloging staff about RDA records when they come across it in their daily copy cataloging routines.* (CAT 7)

> *My management team has not organized any program to create awareness about RDA, because of the small size of our cataloging activity, the low understanding of the RDA standard and our difficulty of understanding the need for changing from AACR2 to RDA in the first place.* (CAT 13)

Influence of the Sources of RDA Awareness on Current Knowledge on RDA

Having identified the various sources of respondents' RDA awareness, the researcher sought to ascertain the influence such sources of awareness had on respondents' current knowledge of the use of RDA as a cataloging standard in libraries. This was aimed at expanding the conversation from merely revealing the most popular sources of awareness to the most influential sources of awareness. Respondents were asked to rate the influence of each source to their level of RDA knowledge on a five-point Likert scale with 1 being the least influential and 4 being the most influential while N/A awarded null or zero points. The data is presented in table 3, using frequencies, percentages, and weighted means.

Table 3 depicts the influence of the sources of awareness of RDA on respondents' current knowledge of RDA.

Level of Knowledge of RDA

Table 3. Influence of the sources of RDA awareness on current RDA knowledge (*n* = 45)

	Influence on Knowledge/Competency					
Source of Awareness	4	3	2	1	NA	**Weighted Mean**
Attendance at local conferences / workshops / seminars	7 (16%)	9 (20%)	2 (4%)	1 (2%)	26 (58%)	3.16
Attendance at international conferences / workshops / seminars	2 (4%)	2 (4%)	1 (2%)	1 (2%)	39 (87%)	2.83
Through fellow catalogers within libraries	12 (27%)	9 (20%)	2 (4%)	-	22 (49%)	3.44
Through fellow catalogers from other libraries	7 (16%)	9 (20%)	1 (2%)	1 (2%)	27 (60%)	3.22
Through personal research	7 (16%)	6 (13%)	1 (2%)	-	31 (69%)	3.42
Through participation in online discussion groups	-	1 (2%)	1 (2%)	-	42 (96%)	2.50
Through Webinars	-	-	1 (2%)	1 (2%)	43 (96%)	1.50
Through social media platforms such as Facebook, Telegram, WhatsApp, X, etc.	1 (2%)	3 (8%)	1 (2%)	1 (2%)	39 (86%)	3.00
Through lectures at library schools	4 (9%)	8 (18%)	4 (9%)	-	29 (64%)	3.00

Source: Authors' construct (2024)

Having established the awareness of the RDA standard among survey respondents, the researchers sought to further ascertain the level of knowledge of RDA among these same respondents. This was to

find out whether the level of knowledge of respondents regarding the RDA standard was at the basic, intermediate, or advanced level.

To this end, respondents were invited to grade their knowledge using fifteen RDA statements made of five basic, five intermediate, and five advanced statements on a five-point Likert scale. This was to ascertain whether respondents were extremely knowledgeable, moderately knowledgeable, somewhat knowledgeable, slightly knowledgeable, or not at all knowledgeable. The findings are presented in table 4 below using frequencies, percentages, weighted means, and average weighted means.

Table 4 demonstrates that a majority of the respondents were extremely knowledgeable about the first five RDA statements ("RDA is a cataloging standard"; "RDA replaced AACR2"; "RDA went into testing for two years"; "RDA was implemented in 2013"; "RDA was built on the foundation of AACR"), which are basic in nature. A relatively lesser portion were found to be moderately knowledgeable about these basic RDA statements. This implies that the majority of respondents were very knowledgeable about the basic RDA statements rather than being limited.

As shown in table 4, a majority of respondents were moderately knowledgeable about the second set of five RDA statements ("RDA requires catalogers to learn new cataloging instructions"; "RDA has affected current cataloging practice"; "RDA requires new MARC fields to accommodate new RDA elements"; "RDA has changed catalog display"; "Change to RDA has led to an increase in the cost of training"), which were intermediate in form. A slightly higher percentage of respondents were found to be somewhat knowledgeable about the intermediate RDA statements. This demonstrates that the majority of the respondents are not extremely knowledgeable regarding these intermediate RDA statements while a lesser percentage were found not to have any knowledge of these statement at all.

Table 4 also shows that the majority of the respondents indicated that they were not at all knowledgeable of the last five RDA statements ("RDA has occasioned some adjustments in integrated library systems"; "RDA is a set of instructions or guidelines to describe all types of resources in all formats"; "Functional requirements for bibliographic records (FRBR) provides the conceptual foundation for RDA"; "RDA data can be encoded using MARC 21 and Dublin Core"; "RDA is a standalone standard that requires libraries who want to adopt to subscribe to the RDA toolkit"), which are advanced in nature. A slightly higher number of respondents indicated that they were only slightly knowledgeable of these advanced statements. This implies that very few of the respondents indicated that they had extreme, moderate, or some knowledge of the advanced RDA statements.

Table 4 again presents the weighted mean of the fifteen RDA statements, as well as the average weighted mean of the three categories of knowledge statements, that is, basic, intermediate, and advanced. Table 5.4 shows the weighted mean ($\bar{x}$) of the basic knowledge statements to be higher than those of the intermediate and advanced knowledge statements thereby leading to the highest average weighted mean for the three categories of knowledge statements, at 3.42.

Based on the average weighted mean of the three categories of RDA statements—basic ($\bar{x} = 3.42$), intermediate ($\bar{x} = 2.89$), and advanced ($\bar{x} = 2.54$)—the researcher concludes that the level of knowledge

Table 4. Respondents' level of knowledge of RDA (*N* = 45)

RDA Statements	Level of Knowledge/Competency					Weighted Mean	Average Weighted Mean
	5	4	3	2	1		
Basic Knowledge/Competency							
RDA is a cataloging standard	18 (40%)	15 (33%)	3 (7%)	3 (7%)	6 (13%)	3.80	
RDA replaced AACR2	16 (35%)	12 (27%)	5 (11%)	4 (9%)	8 (18%)	3.53	
RDA was built on the foundation of AACR	14 (31%)	9 (21%)	8 (17%)	6 (14%)	8 (17%)	3.33	3.42
RDA was implemented in 2013	10 (22%)	7 (16%)	15 (33%)	4 (9%)	9 (20%)	3.11	
RDA went into testing for 2 years	13 (29%)	7 (16%)	13 (29%)	6 (13%)	6 (13%)	3.33	
Intermediate Knowledge/Competency							
RDA requires catalogers to learn new cataloging guidelines	13 (29%)	9 (20%)	10 (22%)	4 (9%)	9 (20%)	3.29	
RDA requires new MARC fields to accommodate new RDA elements	10 (22%)	10 (22%)	7 (16%)	7 (16%)	11 (24%)	2.62	
RDA has changed catalog display	2 (6%)	11 (24%)	11 (24%)	10 (22%)	11 (24%)	2.73	2.89
RDA has affected current cataloging practice	5 (11%)	8 (18%)	13 (29%)	8 (18%)	11 (24%)	3.02	
The change to RDA has led to an increase in the cost of training	3 (7%)	13 (29%)	11 (24%)	8 (18%)	10 (22%)	2.80	
Advanced Knowledge/Competency							
Functional requirements for bibliographic records (FRBR) provides the conceptual foundation for RDA	7 (16%)	4 (9%)	6 (13%)	10 (22%)	18 (40%)	2.18	
RDA data can be encoded using MARC 21 and Dublin core	4 (8%)	7 (16%)	7 (16%)	13 (29%)	14 (31%)	2.87	
RDA is a standalone standard that requires libraries who want to adopt to subscribe to the RDA toolkit	2 (5%)	6 (13%)	9 (20%)	9 (20%)	19 (42%)	2.84	2.54
RDA has occasioned some adjustments in integrated library systems	7 (16%)	9 (20%)	10 (22%)	9 (20%)	10 (22%)	2.38	
RDA is a set of instructions or guidelines to describe all types of resources in all formats	7 (16%)	8 (18%)	11 (24%)	9 (20%)	10 (22%)	2.42	

Source: Authors' construct

of RDA among respondents, and for that matter, catalogers in public university libraries in Ghana, is predominantly basic.

When interviewees were probed as to the estimation of their knowledge in RDA, the majority stated that their knowledge, as well as that of their cataloging staff, was at the basic level.

> *My knowledge of the RDA standard is quite basic and does not extend beyond the fundamentals of the standard. Same can be said for our cataloging staff.* (CAT 12)

CAT 16 observed that:

> *For me, whose knowledge of RDA is predominantly self-taught, I can say my knowledge of the standard is at the basic level.* (CAT 16)

However, a participant from an RDA implementing library observed that:

> *I believe, in all fairness, that myself and the cataloging staff here can be placed at the intermediate level in terms of knowledge of the standard. These are people working with the standard on a daily basis after all, and having their capacities built on a regular basis.* (CAT 10)

Discussion of Findings

Level of Awareness of RDA in Ghanaian Academic Libraries

The level of awareness of the RDA standard is crucial to its widespread adoption and implementation. The awareness of the standard among its key stakeholders and their constituencies engenders positive and impactful conversation in lieu of the adoption and implementation of the standard.

The study found an overwhelming awareness of the RDA standard in Ghanaian academic libraries, as eighty-two percent of survey respondents and 100 percent of interviewees indicated their awareness of the RDA standard. What was found lacking, according to a majority of interviewees, was a conscious and deliberate effort to continually create awareness of the standard and propagate its knowledge among key stakeholders. The inadequacy of institutional involvement in the RDA initiative was also earmarked by interviewees as a worrying trend.

Regardless of the high level of awareness of the standard, the in-house creation of awareness for the RDA standard in the Ghanaian academic library environment has been quite low and this is a theme that readily emerges from the findings of the study. This can only mean that participants of the study became aware of the standard from sources outside of programs initiated by their respective libraries. In all but one of the nine academic libraries studied, the awareness creation of RDA at both the cataloging unit and library management levels, were found to be totally non-existent. This mirrors the finding of Ahonsi, who found the awareness creation of RDA to be very low in sub-Saharan countries.[25] A majority of the academic libraries studied indicate, through their interviewees, that no RDA awareness creation has been initiated at the library management level to promote the standard among catalogers, thereby corroborating a similar finding by John-Okeke of academic libraries in Nigeria.[26] The awareness of RDA among all librarians of different expertise and users is the ideal scenario as they all interrogate the library catalog at one time or the other, but for catalogers and management are absolutely required to be aware of the standard and its contribution.

Sources of RDA Awareness

Knowing the sources of RDA awareness and their influence on propagating RDA knowledge is important, as it demonstrates whether the most popular sources are necessarily the most influential sources for propagating RDA knowledge. This has the capacity of highlighting the most influential sources of publicizing the RDA standard for future implementers. In table 3, the study reveals fellow catalogers within the libraries, personal research, catalogers from other libraries, attendance at local conferences, lectures at library schools, social media, and attendance at international conferences as the most popular and influential sources for creating awareness and propagating RDA knowledge. This partly confirms the findings of Saliu as well as Mansor and Ramdzan who found these sources as RDA awareness creation avenues. Where these studies fall short, is the determination of the extent of influence of these sources on the propagation of RDA knowledge.[27]

In the studies undertaken by Maurer and Panchyshyn, Mansor and Ramdzan, and Wacker and Han, Library and i-Schools are identified as instrumental in creating awareness of the RDA standard and entrenching RDA knowledge among catalogers.[28] This is contrary to the finding of this study, where the impact of library schools as an avenue for creating awareness of and disseminating RDA knowledge was found to be quite low. This is surprising, considering the fact that most of the respondents with a professional librarianship background are between the ages of thirty and fifty, and passed through the education offered in Ghana's library schools within the last decade. The fact that library schools in Ghana, still, at the time of this research do not feature RDA in their curriculum at the undergraduate, graduate, and post-graduate levels, as evidenced from their cataloging syllabus, is surprising and surely contributes to the lack of adoption and implementation of RDA in Ghana.

Awareness creation through local conferences, workshops, and seminars was lowly ranked and fell outside the top three influential sources of RDA knowledge. This revelation was substantiated by interviewees in the qualitative phase of the study, who confirmed the paucity of RDA training programs in the Ghanaian library space. The relatively more experienced participants, who have been around for a while and had institutional memory, could attest to only one such local RDA training program, a joint collaboration between the Consortium of Academic and Research Libraries in Ghana (CARLIGH) and the International Network for Advancing Science and Policy (INASP), in 2012. This shows clearly that professional librarianship bodies and organizations in Ghana have not been effective in creating awareness about the RDA standard. This is in stark contrast to what happened in South Africa, where the national library was vibrant in creating awareness, and Nigeria, where, although the implementation of the standard is not widespread, professional librarianship bodies have been active in organizing basic workshops and seminars in a bid to create awareness of the standard among their members.[29]

It is also instructive to observe that other catalogers from within respondents' libraries and in other libraries emerged as influential sources of RDA awareness and knowledge. This establishes the presence of a form of social nexus among Ghanaian catalogers and leads one to question the difficulty of having an organized cataloging community in Ghana as established by interview participants. The absence of a

vibrant cataloging community in Ghana, as established by the study, can be ascribed as a contributory factor to RDA's unpopularity, coupled with lack of impact of social media and webinars as sources of RDA awareness and knowledge. This is because such a constituency would ideally be instrumental in advancing the standard in such regards, as is the case in South Africa, where the activism of the Library and Information Association of South Africa (LIASA) has been vibrant. This finding is at variance to the situation in the advanced jurisdictions, as reported by El-Sherbini, Kalwara, Dale and Coleman, Park and Tosaka, and Turner, where an active cataloging community played a key role in influencing opinions about the standard.[30]

Knowledge of the RDA Standard

The knowledge of the RDA standard ensures the success, entrenchment, and longevity of the standard. Thus, knowledge of the RDA standard, rather than the mere awareness of the standard, is what guarantees the success of the standard. The study finds that, although awareness of the RDA standard is quite high among respondents and interviewees, knowledge of the standard among these same people was very low. This corroborates the findings of Ahonsi, to the effect that knowledge of the standard lags behind its awareness in many countries in sub-Saharan Africa.[31] It again confirms the conclusion of Ifijeh, Segun-Adeniran, and Igbinola who reported that libraries across the African continent have largely been aware of the RDA standard since its implementation in 2013.[32] This study revealed that the level of knowledge of RDA, among respondents and interviewees alike, was predominantly basic and this supports the positions established by Oguntayo and Adeleke and John-Okeke.[33]

The basic level of RDA knowledge in Ghana accounts for the relatively low implementation of the standard in Ghana. The absence of Ghanaians adequately knowledgeable in the workings of RDA has denied the country the expertise needed to build the capacities of Ghanaian catalogers and change the direction of the country's bibliographic description. This has, in turn, been flagged as a prime inhibiting factor of RDA implementation in Ghana and the inability of library management of academic libraries and library organizations in Ghana to organize RDA training programs for staff and librarians alike in this study. This conclusion supports earlier findings by Oguntayo and Adeleke, in the case of Nigeria.[34]

Implication of Awareness and Knowledge of RDA

The foregoing demonstrates that awareness of RDA may not lead to a successful adoption and implementation of the standard in Ghana. The relatively high levels of awareness of the standard, as established in this study, have not translated into widespread adoption and implementation of the standard. On the contrary, the standard is more likely to be implemented successfully in Ghana, if the knowledge of RDA among catalogers in Ghanaian university libraries surpasses the basic level. This implies that Ghanaian university libraries are likely to face difficulties in their quest to implement RDA in their libraries, unless knowledge of the standard in the country transcends its current basic level to intermediate and, preferably, advanced levels. Achieving such an objective will require a concerted effort on the part of the national library, academic library management, professional library organizations, and the library schools in Ghana. Knowledge of the standard is likely to be advanced with

widespread implementation in the country but, with the current state of non-implementation in all but one public academic library, the predominant basic level of RDA knowledge is not only surprising but worrying.

Conclusion

This study demonstrates that RDA awareness among cataloging librarians in Ghanaian university libraries is significant. The individualized nature of both the most popular and influential sources of RDA awareness indicates the limited involvement of institutions in RDA awareness creation. Unfortunately, knowledge of RDA has not fared as well, hardly transcending the basic level, even for practitioners in the only library that has implemented RDA. To a large extent, this trend is driven by the inactiveness of institutional stakeholders in the RDA conversation, although they are ideally placed to facilitate the development of RDA knowledge among Ghanaian catalogers. The active involvement of institutional stakeholders in the RDA initiative in Ghana would advance the success of the RDA standard in the country as such organizations are likely to pursue RDA awareness creation and knowledge propagation concurrently, a strategy that has been engaged to great effect in other jurisdictions such as Europe, the Americas, and South Africa.

Recommendations

To enhance the level of awareness and knowledge of RDA in academic libraries in Ghana, the authors suggest that:

1. Academic library management should promote awareness and knowledge of the RDA standard through in-house training programs.
2. Professional librarianship institutions and organizations such as CARLIGH, GLA, and AHELD should actively involve themselves in the RDA adoption and implementation conversation by featuring the standard in webinars, conferences, meetings, and other training programs.
3. Catalogers in academic libraries in Ghana should form a cataloging community, under the auspices of existing bodies such as GLA and CARLIGH, to influence policies and pursue issues of common interest such as creating awareness about RDA and propagating its knowledge.
4. Academic library management and professional librarianship institutions and organizations, such as CARLIGH, GLA, and AHELD, should look beyond RDA awareness to RDA knowledge propagation, as the latter contributes more to the successful implementation of the standard.
5. Library schools in Ghana should incorporate RDA in their cataloging syllabi and gradually phase out the teaching of AACR2 in an attempt to advance knowledge of and competence with the new standard.

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NOTES ON OPERATIONS

Assessing Opt-In Rates for Transformative Agreements

Daniel G. Tracy, Elizabeth A. Budd, Thomas H. Teper

With increasing requirements for open access (OA) by funders, academic libraries have begun piloting so-called "transformative agreements" with publishers. One type of agreement gives researchers at an institution read access to all content while also allowing them to publish articles OA in hybrid (and sometimes gold) OA journals without payment of an Article Processing Charge (APC). Such models often give corresponding authors from an institution the ability to opt in or out of making their article OA for hybrid journals. This article provides an assessment of two pilot transformative agreements at one large research institution that participated as a member of a consortium. It provides insight into opt-in rates overall for each publisher as well as breakdowns by disciplinary affiliation and rank of the researchers, as well as the combined impact of the agreement and other mechanisms on the overall OA availability of research at these publishers with researchers at the institution regardless of corresponding author status. The discussion includes a review of lessons learned and the overall benefits and challenges of working with such agreements.

Recent years have seen a steady rise in transformative agreements with various publishers. Such agreements take different shapes, but in general are agreements "in which former subscription expenditures are repurposed to support open access publishing of the negotiating institutions' authors, thus transforming the business model underlying scholarly journal publishing, gradually and definitively shifting from one based on toll access (subscription) to one in which publishers are remunerated a fair price for their open access publishing services."[1] The term transformative agreement updates what were previously called offset agreements, but the two terms share the concept that subscription funds are redirected to publication costs.[2]

The University of Illinois Urbana-Champaign through The Big Ten Academic Alliance (BTAA) participated in pilot transformative agreement programs for Cambridge University Press (2021–2022) and Wiley (February-December 2022). Although these are not the first transformative agreements into which the University entered, they are different from the prior agreements in terms of the number of journals and breadth of disciplines covered—particularly Cambridge, which is a much more significant publisher in the humanities and social sciences. Both were read and publish agreements, funding both institutional reading access and a limited number of full waivers of article processing charges (APCs) for articles published by the institution's corresponding authors. Authors have the opportunity to opt in or

Daniel G. Tracy (dtracy@illinois.edu), Associate Professor and Head, Scholarly Communication and Publishing, University of Illinois Urbana-Champaign, https://orcid.org/0000-0002-0106-6293. **Elizabeth A. Budd** (eabudd2@illinois.edu) received her MS-LIS from the University of Illinois Urbana-Champaign in May 2024, https://orcid.org/0009-0008-0919-7459. **Thomas H. Teper** (tteper@illinois.edu), Professor and Associate Dean of Libraries for Collections and Technical Services, University of Illinois at Urbana-Champaign, https://orcid.org/0000-0001-6629-0678.

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out of these agreements, but the workflows for doing so differ, both at the point of the article agreement process and retroactively.

This article seeks to understand and evaluate the impact of these pilots on the open access (OA) output by one institution's researchers. To do so, we use quantitative analysis to answer the following specific, interrelated questions:

1. What is the overall opt-in rate for OA publishing under the Cambridge and Wiley transformative agreement pilots?
   a. Are there local differences in opt-in rates among researchers from different disciplines or campus units, or based on author seniority?
2. How does the University's OA output (as a percentage of publications) with Cambridge and Wiley compare to previous years?
3. Because these agreements are both part of a larger consortial agreement, what is the broader indirect impact of the consortial agreement on the percentage of local OA output from these publishers due to co-authorship with corresponding authors at other participating institutions?

Background

A combination of opportunity and deliberate work through consortial agreements characterizes the University of Illinois's path toward implementing transformative agreements. The BTAA licenses many journal agreements on behalf of its members. Simultaneously, many locally licensed agreements remain in renewal cycles established by previous negotiations. Consequently, the institution sits firmly within the midst of a prolonged transitional period rather than on one side or another of a profound transformational moment.

Early institutional support for OA publishing and infrastructure included serving as a founding member of SCOAP3, support for arXiv's transition toward a community-supported model, and participation in Knowledge Unlatched's open book publishing pilots. With respect to publishing infrastructure and monograph publishing, the University does support several agreements either directly or through consortial partnerships. As early as December 2018, investigations by William H. Mischo and Thomas H. Teper demonstrated external-to-the-library institutional support of nearly $1 million annually in APCs paid in support of faculty-authored papers between 2013 and 2018.[3] Further internal research of 2019 ranked publishing output among University faculty as follows, from largest to smallest: Elsevier, IEEE, Springer-Nature, Wiley, American Chemical Society, Taylor & Francis, ACM, Sage, MDPI, American Physical Society, American Institute of Physics, IOP, Cambridge University Press, Frontiers, and the Royal Society of Chemistry.

The University of Illinois began a process of converting existing traditional license agreements as opportunities arose, depending on renewal cycles and the publisher's available transformational models. Agreements were established with IEEE (2019), MDPI (2021, discount only), Elsevier (2024), ACM (2024), IOP (2024), AIP (2024), and other presses with smaller numbers of local scholarly outputs. In some cases, the institution licenses journal access on a title-by-title basis, limiting

opportunities to publisher-focused transformational licenses. In other cases, particular publishers may not support or have not supported transformational agreements without comprehensive read access licenses.

This renewal cycle model primarily governs how transformational agreements moved through consortial negotiations. Working through its primary licensing partner, the BTAA, the University of Illinois Urbana-Champaign implemented transformational publishing models with Wiley and Cambridge University Press. With Wiley's and Cambridge's opt-in model OA agreements in place for multiple years, this examination focuses on the transitional pathway and opt-in rate for authors with both of these publishers. In both cases, affiliations are driven by the corresponding authors' home institutions, and OA rights are limited to peer-reviewed, scholarly articles.

Literature Review

A number of studies have looked at the general (regardless of discipline) impact of early offset agreements or later transformative agreements, usually in regard to specific countries or regions in Europe or at specific publishers. For example, Lisa Olsson et al. reported the impact of one year of the Springer offset agreement (the "Spring Compact") in Sweden, showing a growth of between 595 percent and 885 percent in hybrid articles published OA in 2017, with the variation depending on assumptions made about historical trends.[4] This agreement did not include the option to opt out, however, and the growth does not necessarily reflect this consideration. Mafalda Marques and Graham Stone examined a three-year Springer offset agreement in the UK and Europe, the first study to report the impact of an opt-in/opt-out model for at least some of the institutions and countries studied. In the UK, 35 percent opted out of the agreement in the first year with opt-out rates dropping to 18 percent and 17 percent in subsequent years, with other countries starting with only 16–18 percent opt-out rates and then lowering slightly from there.[5] Rita Pinhasi, Lothar Hobling, and Brigitte Kromp reported on analysis of the first year of a Wiley deal with Austrian academic libraries in the KEMO consortium. Authors in the KEMO consortium had a 74 percent opt-in rate for gold and hybrid combined; in comparison, 45 percent of articles with a corresponding author in Austria and 10 percent globally were published OA in gold and hybrid Wiley journals during this period.[6] The studies by Marques and Stone and by Pinhasi, Holbling, and Kromp suggest that improved author opt-in workflows were a significant factor in improving opt-in rates. This aligns with earlier work by Pinhasi et al. and by Christian Gumpenberger, Lothar Hölbling, and Juan Ignacio Gorraiz that suggested publisher workflows, variances between them, and the corresponding author model poses a variety of problems for transformative agreement uptake.[7]

A couple of studies analyzed transformative agreements to consider a transition to OA more broadly. Mandy Hill analyzed early transformative agreements held at Cambridge University Press across institutions; she noted that over 80 percent of articles from institutions with transformative agreements were OA as a result. These agreements had a major impact on the proportion of OA output from the press overall, growing from only 5 percent of articles in 2018 to 37 percent in 2021, with anticipation of reaching over 50 percent in 2022.[8] She noted that Cambridge has a goal of transitioning all journals to

OA by 2025. Others have questioned whether even with growth in OA output the agreements can fully succeed. Wilhelm Widmark, observing the case in Sweden, noted that such agreements had resulted in 75 percent open access in 2021, significant progress but short of the 100% benchmark set that year and at a high cost that may put a full transition out of reach.[9] Ángel Borrego, Lluís Anglada, and Ernest Abadal, analyzing the ESAC registry agreements, designate some as "pre" or "partially" transformative rather than "fully" transformative.[10] When Vladimir M. Moskovkin, Tatyana V. Saprykina, and Igor V. Boichuk analyzed agreements in the ESAC registry, they saw a growth of 230 percent in just over one year in such agreements but only a 150 percent growth in OA articles.[11] The 2022 and 2023 "Transformative Journal" reports from cOAlition S showed a number of such journals failing to meet targets and thus being removed from that program, which was one strategy promoted for Plan S compliance.[12]

Transformative agreements are still relatively new, however, and judging their impact may be premature. For example, Niels Taubert et al. have provided recent statistical analysis of factors impacting uptake of gold and hybrid OA in Germany over a multi-year period. They noted that in 2020, transformative agreements began to have a statistically significant impact on uptake of OA, accounting for 12 percent of variance in adoption of OA between institutions in that year and apparently growing. They found no impact on OA uptake from the presence of specific OA infrastructure and services. By far the largest impact they found was based on the overall disciplinary profile of the institution, although the nature of their analysis presents the disciplinary profile as a score and did not distinguish the impact of specific disciplines.[13]

Studies that have examined disciplinary differences related to OA mostly predate transformative agreements and tend to focus on surveys of researchers' self-reported behaviors and beliefs. Jennifer Rowley et al. showed similar reported ratios of OA to non-OA article publications among scientific, technical, and medical scholars and humanities and social science (HSS) scholars, as well as similar levels of uncertainty about future practices, with small differences in specific ideas about OA.[14] Likewise, in a survey of scholarly societies, Alicia Wise and Lorraine Estelle found little difference in the level of experience of different disciplines with OA publication, but greater concern about the APC model among HSS societies.[15] Yimei Zhu reported similar levels of perceived importance of OA across different groups but found different publication behaviors among disciplines in the UK, with researchers in the medical and life sciences more likely to publish gold OA, natural sciences and engineering more green (i.e., repository-based) OA, and HSS researchers reporting less of both.[16] Carol Tenopir et al. and later Elizabeth Dalton, Carol Tenopir, and Bo-Christer Björk found greater acceptance of OA among science and engineering researchers and more anti-OA sentiment among HSS disciplines, with math scholars falling into the more positive group in the earlier study and the more negative group in the second study.[17] A larger literature synthesis by Anna Severin et al. in 2018 and 2020 has found a general shift towards OA across disciplines over the last three decades, but with unevenness among disciplines in terms of the degree of the shift and the primary mechanisms for OA (i.e., journal vs repository).[18] Thus these studies show some inconsistencies as to whether or not they report a real disciplinary difference.

The intersection of OA with researcher seniority has been less studied, and the reported results have been inconsistent. For example, Zhu's study shows more experience with both green and gold OA among older or senior academics, and Philips Ayeni and Rebekah Willson show greater OA article publication rates in OA journals by mid-career humanists than early career researchers.[19] By contrast, the studies by Tenopir et al. and Dalton, Tenopir, and Björk found more acceptance of OA among doctoral students and post-doctoral researchers.

Methods

We gathered publication details and calculated descriptive statistics for article publications from the university in Cambridge (2021–2022) and Wiley (2022) journals during the pilot period and in the years prior to the pilots beginning (2019–2020 for Cambridge; 2019–2021 for Wiley). Publication information was gathered in two ways: first, the vendors provided lists of articles where the responsible corresponding authors had opted into and out of the agreements. Both publishers provided an opportunity for authors to retroactively opt in, and we contacted local corresponding authors who had opted out to confirm they were aware of their eligibility and the opportunity to opt back in. We supplemented the publication data with public information about the primary department and college of the responsible corresponding author as well as their rank (graduate student, faculty, academic professional, or other). In some cases, the process of supplementing the data revealed that a responsible corresponding author had been mis-assigned to the university's agreement and these were removed from the data set and the publisher was notified so that they could correct the author affiliation information and notify the appropriate institution—most frequently another institution in the university system that also participated in the consortial agreement. We also verified and supplemented the list of publications against the public data in the local researcher information management system, Illinois Experts, a branded version of Pure. This data could only answer the first question related to opt-in rates for University of Illinois Urbana-Champaign corresponding authors, however. We therefore gathered data from Illinois Experts for a full list of articles with a local author or co-author in the publishers' eligible journals and limited this list to articles in eligible article types (excluding, for example, editorials and book reviews). Data verification and maintenance in Illinois Experts helps ensure a comprehensive list for these publishers and journals, and use of this data set avoided possible missed articles in cases where a publisher may have misassigned author affiliations to another institution. This report provided a full list of institution-affiliated articles where the local author was not the first author. We also pulled similar data from the same system for years prior to the agreements back to 2019: this data would allow us to answer the second and third questions.

Question 1 asked about the overall opt-in rate for the pilot agreements, with a sub-question about differences in opt-in rates among different disciplines or by author seniority. We calculated the overall opt-in rate for each year of the Cambridge University Press pilot agreement and the eleven-month period of the Wiley pilot agreement. To examine disciplinary variation, we used the author affiliation coding added to the data set to calculate the opt-in rate for each college. In the case of one college, Liberal Arts and Sciences, we calculated departmental opt-in rates due to the extreme disciplinary

variation within the college. We also performed a departmental breakdown for Engineering after observing a higher than anticipated opt-out rate for the Cambridge agreement (see "Results"). We also calculated opt-in rates broken down by author seniority status, captured in the categories of graduate student, assistant professor (regardless of tenure-line or specialized faculty status), associate or full professor (regardless of tenure-line or specialized faculty status), post-doc, and other academic staff.

Question 2 asked about the overall change in OA output from the university in the hybrid journals covered by the agreements compared to prior years. For this question, we calculated the percentage of articles in eligible article categories published OA in their final version of record for each year prior to and during the agreements beginning with 2019, inclusive of all eligible articles regardless of whether a local institutional author was the responsible corresponding author. Because transformative agreements base hybrid APC waiver eligibility on article acceptance date, the data for prior years is not strictly comparable. For the purposes of our analysis, however, we deemed it a reasonable proxy.

Question 3 asked about the impact of the broader consortial agreement on the overall OA rate. For this, we returned to the full set of qualifying articles published in eligible journals for the pilot years regardless of the responsible corresponding author's institution. In cases where we did not have the acceptance date for the publication, the publication date was used as a proxy, although we realize this is an imperfect match. Each of these was coded as having a local institutional responsible corresponding author, a responsible corresponding author from another institution in the consortium, or a responsible corresponding author from other institutions not covered by the consortial agreement (but which may be covered by other similar agreements). We then calculated percentages of OA and non-OA articles belonging to each of these groups.

Results

During the pilot period, a total of 251 articles were eligible for the transformative agreements, with 180 of those articles in Wiley journals and seventy-one articles in Cambridge journals (figure 1). Question 1 asked about the opt-in rates for each pusher during the pilot agreements. Of the articles in Wiley journals, 156 opted in to OA (87 percent), while twenty-four articles opted out (13 percent). For the two-year pilot period with Cambridge, fifty-six articles opted in (79 percent), and fifteen articles opted out (21 percent). The proportion of articles opting in to OA increased from the first year of the Cambridge pilot period to the second. In 2021, twenty-three of thirty-five articles opted in (66 percent), thirty-three of thirty-six articles opted in to OA in 2022 (92 percent).

Disciplinary Comparison

Question 1a asked about differences in opt-in rates for different disciplines. The seventy-one articles in Cambridge journals were published by authors from eight colleges and schools, the University Library, and the local Prairie Research Institute (figure 2). All authors from the College of Fine and Applied Arts, the School of Labor and Employment Relations, the College of Law, the Prairie Research Institute, and the University Library opted in to OA (ten articles total). For the other units, the OA

opt-in rates were 86 percent for the College of Agricultural, Consumer, and Environmental Sciences (six of seven total articles), 67 percent for the College of Applied Health Sciences (two of three total articles), 75 percent for the College of Education (three of four total articles), 67 percent for the College of Engineering (ten of fifteen total articles), and 78 percent for the College of Liberal Arts and Sciences (twenty-five of thirty-two total articles).

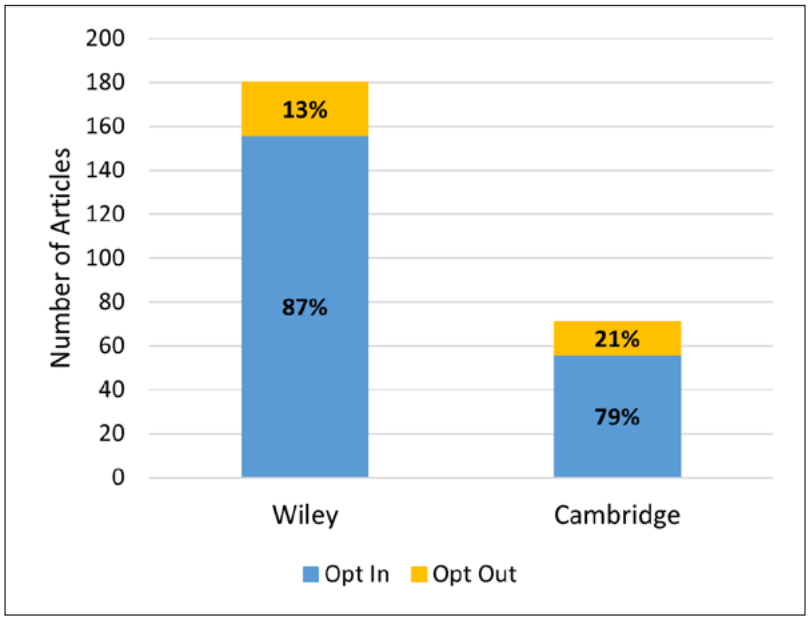

Figure 1. Overall opt-in and opt-out rates by publisher.

The fifteen articles in Cambridge journals with corresponding authors from the College of Engineering were spread across four departments (figure 3). All articles with authors from Aerospace Engineering (two) and Civil and Environmental Engineering (three) opted in to OA. There was one article with a corresponding author in Materials Science and Engineering, which opted out. Mechanical Science and Engineering had eight total articles, with five opting in (63 percent) and three opting out (38%).

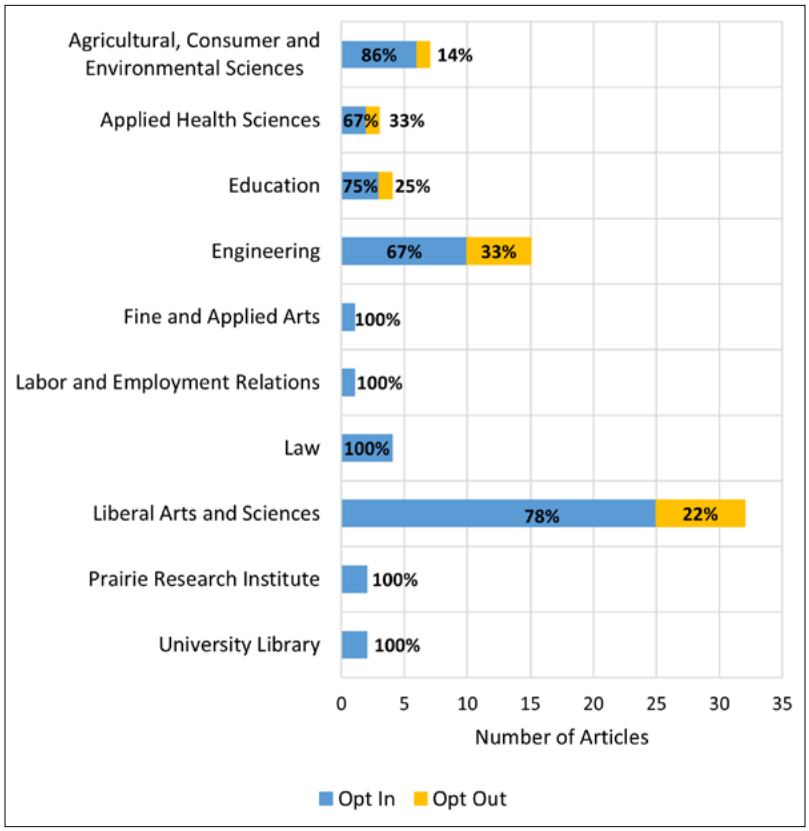

Figure 2. Cambridge opt-in and opt-out rates by college.

The thirty-two articles from the College of Liberal Arts and Sciences were spread across fourteen departments (figure 4). Nine of these departments had one or two articles, all of which opted in to OA. Mathematics had two articles, both of which opted out. The Department of Spanish and Portuguese had four total articles, which were split evenly between opting in and opting out. The departments of Anthropology, History, and Linguistics each had one opt-out article, equivalent to 33 percent, 13 percent, and 25 percent of the departments' articles, respectively.

The 180 articles in Wiley journals were published by authors from thirteen colleges and schools, as well as authors from the Prairie Research Institute (figure 5). All authors from the College of Business, the College of Fine and Applied Arts, the School of Information Sciences, the School of Labor and Employment Relations, the College of Media, and the School of Social Work opted in to OA (fourteen articles total). For the other units, the opt-in to OA rates were 88 percent for the College of Agricultural, Consumer, and Environmental Sciences (thirty-seven of forty-two total articles), 25 percent for the College of Applied Health Sciences (one of four total articles), 80 percent for the College of Education (four of five total articles), 85 percent for the College of Engineering (twenty-nine of thirty-four total articles), 93 percent for the College of Liberal Arts and Sciences (fifty-two of fifty-six total articles), 0 percent for the College of Medicine (one total article that opted out), 79 percent for the Prairie Research Institute (eleven of fourteen total articles), and 80 percent for the College of Veterinary Medicine (eight of ten total articles).

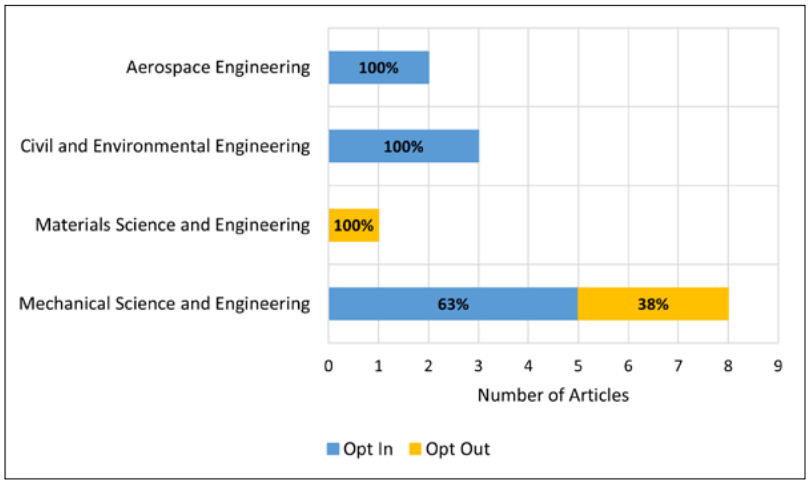

Figure 3. Cambridge opt-in and opt-out rates by engineering department.

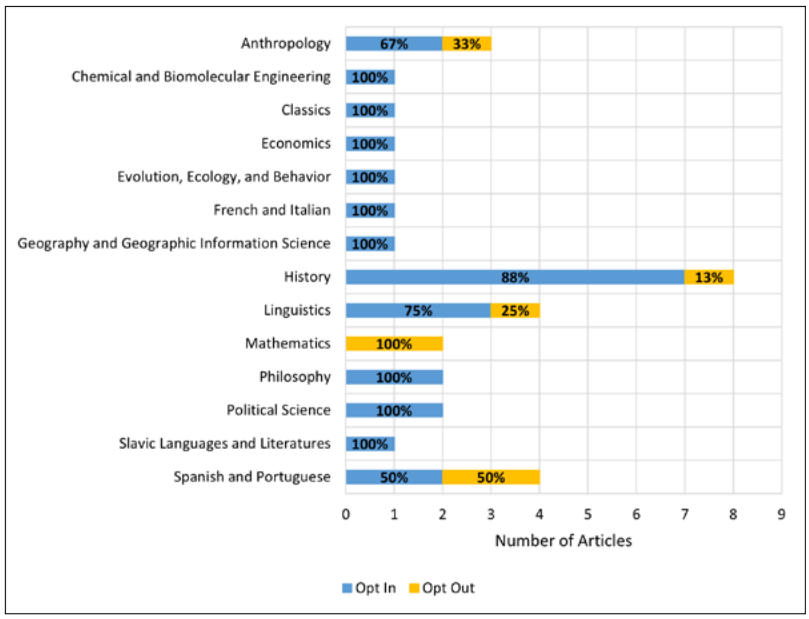

Figure 4. Cambridge opt-in and opt-out rates by liberal arts and sciences department.

The thirty-four articles in Wiley journals with corresponding authors from the College of Engineering were spread across six departments (figure 6). All articles with authors from Bioengineering (three), Electrical and Computer Engineering (eight), and Physics (one) opted in to OA. Material Science and Engineering and Mechanical Science and Engineering each had one article opt out, for opt-in rates of 91 percent and 75 percent, respectively. Civil and Environmental Engineering had seven total articles, with four opt-ins (57 percent) and three opt-outs (43 percent).

The fifty-six articles from the College of Liberal Arts and Sciences were spread across eighteen departments (figure 7). Fourteen departments had 100 percent opt-in rates, with total numbers of articles ranging from one to seven. Anthropology, Chemistry, Geology, and Microbiology each had one

opt out, for opt-in rates of 50 percent, 83 percent, 75 percent, and 80 percent respectively.

Author Seniority Comparison

Question 1a also asked about opt-in and opt-out rates by author seniority. In Cambridge journals, articles with corresponding authors who were graduate students, (tenure-line and specialized) assistant professors, and (tenure-line and specialized) associate and full professors all had opt-in rates of 79 percent, from a total of nineteen, fourteen, and thirty-three articles, respectively (figure 8). One article with a postdoctoral researcher as the corresponding author opted out, and of the four articles with other academic staff corresponding authors, three opted in (75 percent).

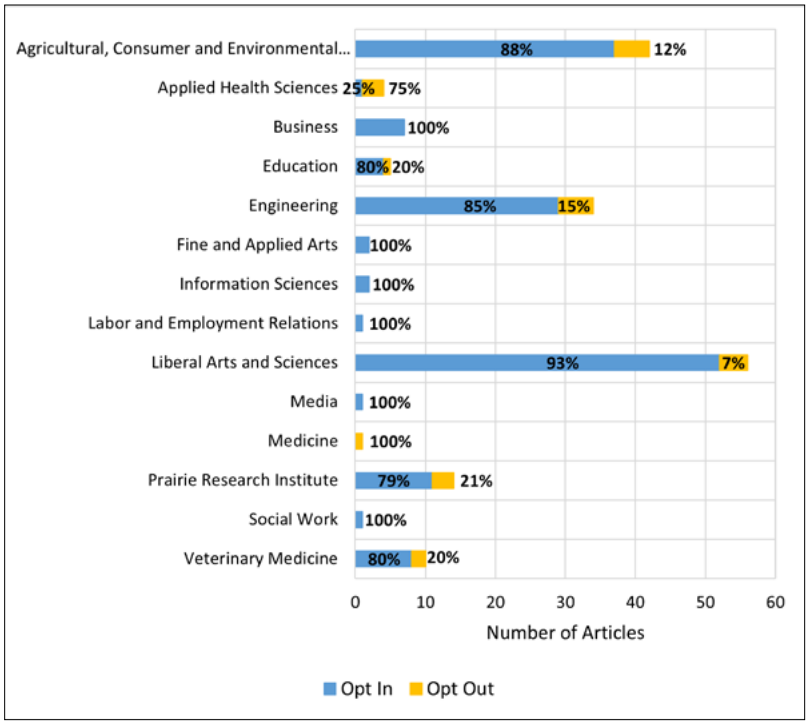

Figure 5. Wiley opt-in and opt-out rates by college.

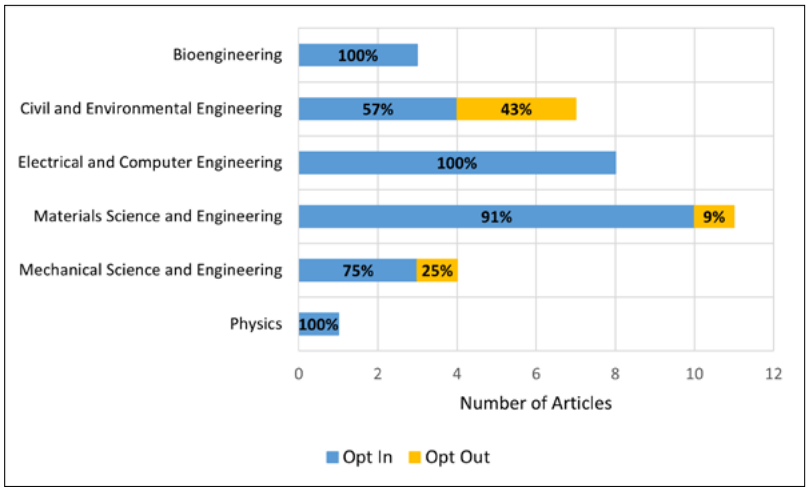

Figure 6. Wiley opt-in and opt-out rates by engineering department.

In Wiley journals, 83 percent of articles with corresponding authors who were (tenure-line and specialized) associate and full professors opted in in (seventy-nine of ninety-five total articles, figure 9). For articles with corresponding authors who were (tenure-line and specialized) assistant professors, 97 percent opted in (thirty-three of thirty-four total articles). All nine articles with corresponding authors who were postdoctoral researchers opted in to OA. For graduate student corresponding authors, 87 percent of articles opted in (twenty-six of thirty total articles). Twelve total articles had other academic staff corresponding authors, with 9 articles that opted in (75 percent), and three articles that opted out (25 percent).

Overall Growth in OA Output with the Two Publishers

For Question 2, we examined the impact of the transformative agreements on the overall number of OA articles in hybrid journals published by Wiley and Cambridge by university authors (figure 10). For this phase of analysis, the corresponding author did not need to be affiliated with our university, but the articles did have to be an eligible article type (i.e., research articles). This data is thus a more inclusive set for the pilot years than the data used in the analysis of Question 1. In 2019, the percentage of OA articles published in these journals by university authors was less than 10 percent. Both publishers show a small amount of growth in OA articles in 2020. Between 2020 and 2021, the first year of the pilot period of Cambridge, the percent of OA articles in Cambridge journals increased from 18 percent to 53 percent. This growth continued into the second year of the pilot program, increasing to 79 percent of articles published by University of Illinois Urbana-Champaign authors in 2022. For Wiley, there was a small amount of growth in OA from 2020 to 2021. A large increase in OA occurred between 2021 and 2022, when the pilot program went into effect, from 15 percent to 56 percent of articles being published OA.

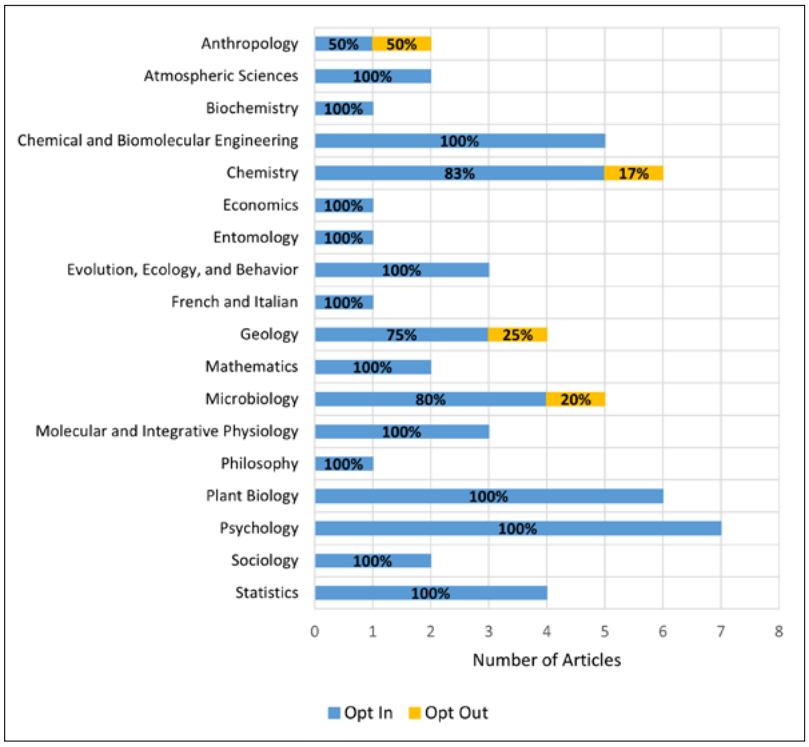

Figure 7. Wiley Opt-In and Opt-Out Rates by Liberal Arts and Sciences Department.

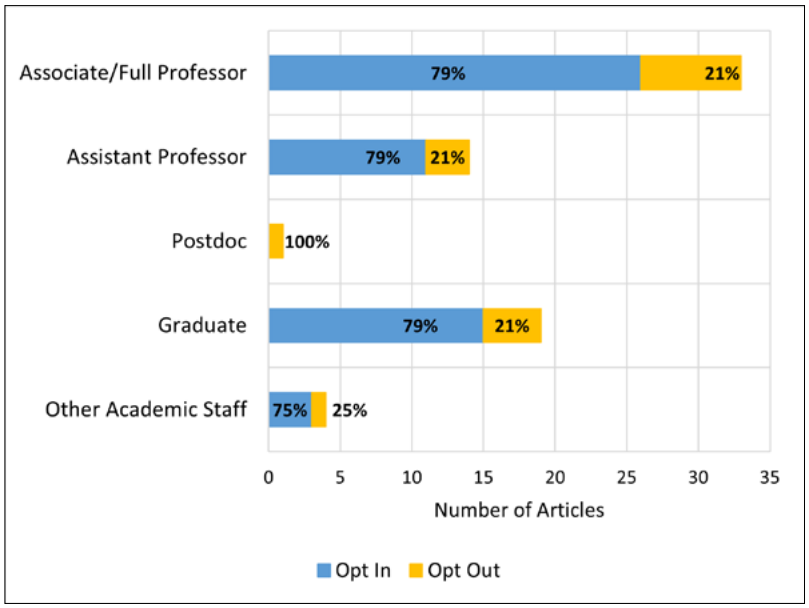

Figure 8. Cambridge Opt-In and Opt-Out Rates by Author Status.

Consortial Impact

Finally, for Question 3, we examined the impact of the pilot transformative agreements on the OA output of university authors. Of all the articles published in Cambridge journals in 2021 by university authors, 48 percent of those articles had a University of Illinois Urbana-Champaign corresponding

author and were OA, while 17 percent had a local corresponding author but were not OA (figure 11). Five percent had a corresponding author affiliated with another participating BTAA institution and were published OA, while 2 percent had corresponding authors from those institutions and were not OA. Finally, 7 percent of articles had corresponding authors from other institutions and were OA, while 21 percent had non-BTAA authors and were not OA.

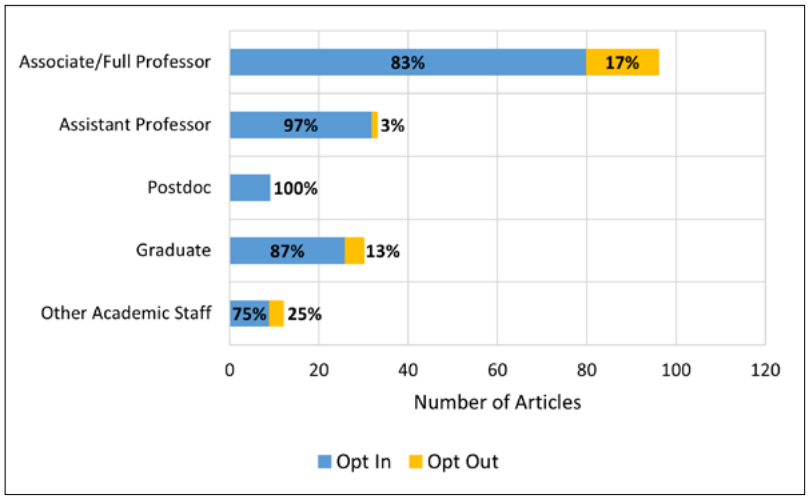

Figure 9. Wiley opt-in and opt-out rates by author status.

Of all the articles published in Cambridge journals in 2022 by university authors, 57 percent of those articles had a University of Illinois Urbana-Champaign corresponding author and were OA, while 9 percent had a local corresponding author but were not OA (figure 12). Three percent had a corresponding author affiliated with another participating BTAA institution and were published OA. Finally, 19 percent of articles had corresponding authors from other institutions and were OA, while 12 percent had non-BTAA authors and were not OA.

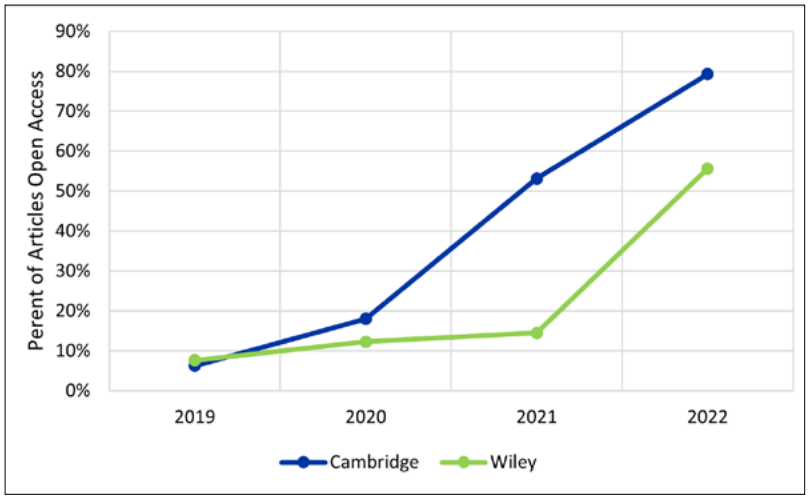

Figure 10. Percent of articles open access by publisher, 2019–2022.

Of all the articles published in Wiley journals in 2022 during the pilot period by university authors, 42 percent of those articles had a University of Illinois Urbana-Champaign corresponding author and were OA, while 8 percent had a local corresponding author but were not OA (figure 13). Four percent had a corresponding author affiliated with another participating BTAA institution and were published OA, while 1 percent had corresponding authors from those institutions and were not OA. Finally, 17 percent of articles had corresponding authors from other institutions and were OA, while 29 percent had non-BTAA authors and were not OA.

Discussion

The opt-in rates (figure 1) demonstrate significant OA publishing uptake for both agreements. Although the overall opt-in rate for the first year of the Wiley agreement was higher than that for the two-year

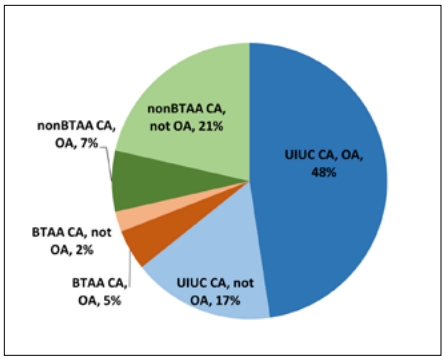

Figure 11. Cambridge pilot period articles by corresponding author and open access status, 2021.

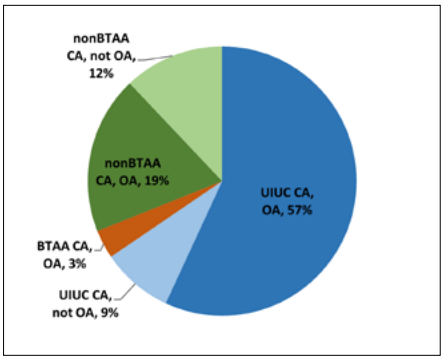

Figure 12. Cambridge pilot period articles by corresponding author and open access status, 2022.

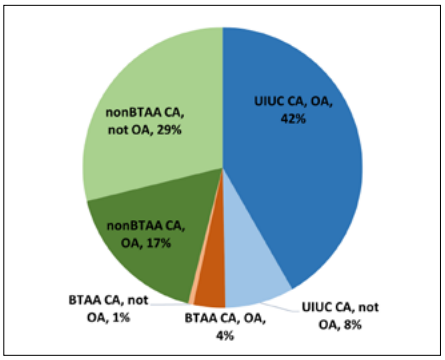

Figure 13. Wiley pilot period articles by corresponding author and open access status, February 1, 2022–December 31, 2022.

period for Cambridge, the year-by-year numbers show a substantial increase between year one and year two, with the second year in fact exceeding the first year of the Wiley agreement. Differences between the two publishers are notable in explaining the differences in opt-in rates. For example, Cambridge switched from a default opt-out to a default opt-in model late in the first year and, more importantly, had a much longer eligibility period for published articles to retroactively opt back in. Cambridge corresponding authors could opt back in as late as the end of March of the year following the year the article was accepted. Wiley articles only had the period between acceptance and publication, which was typically around a month. This feature of the agreement has since been changed to lengthen the retroactive eligibility period, and Wiley has also made the process for doing so easier. The changes were due in part to feedback from library consortium members including our university.

Figure 10 also shows how the degree of OA output from university publications with these two publishers, including articles outside the agreement scope, increased at a much higher rate as these agreements came into effect: OA articles edged upwards as a proportion of total articles in the year or years prior to the agreements but leapt by around 40 percent in the first year of each agreement, and by another 25 percent in the second year of the agreement in the case of Cambridge. Figures 11, 12, and 13 demonstrate the relation of that growth to the location of corresponding authors regardless of institution. Figures 11 and 12 suggest not just the increased uptake of the Cambridge agreement in the second year (with all relevant articles with co-authors based at another consortium institution opting in) but a steep drop in non-OA co-authored articles with corresponding authors from outside the consortium in the second year. While it is a limitation of the study that we do not know which of these non-consortium articles may have been eligible under similar agreements at other institutions and consortia rather than being paid for by APCs, this is the likely inference and if true, further demonstrates the network effects these agreements can have across institutions—an important factor in whether such agreements can achieve their goal of transitioning content to OA at scale. The fact that articles with corresponding authors at non-consortial institutions have the highest rates of non-OA articles confirms the importance of these agreements in moving the needle at publishers with medium-to-large journal collections.

Opt-in rates by college—and by department within larger colleges—for the Cambridge agreement (figures 2–4) and the Wiley agreement (figures 5–7) do not suggest disciplinary differences in opt-in rates. Indeed, there was not consistency across the two agreements in terms of disciplines that opted out. For example, in the Cambridge agreement one of the highest opt-out rates came from Mechanical Science and Engineering, which had a very low opt-out rate for the Wiley agreement; the reverse was true for Civil and Environmental Engineering. Although it may be true that humanists have expressed more skepticism about OA, the actual opt-in behavior when cost barriers are eliminated appears, locally, to be negligible. The uptake does not mean that scholars have no concerns about the specific financial models involved in open publishing or sustainability, but these do not equate with an unwillingness to publish OA. In other words, it is important for studies exploring disciplinary differences in OA publishing not to conflate willingness to publish OA with the acceptance of payment-based OA models, or with lack of critiques of specific OA models. Such studies should account for the various structural challenges faced in specific publishing communities such as those outlined in Severin et al.'s description of the barriers facing OA in the humanities.[20]

Figures 8 and 9 likewise show little reason to suspect impact of author seniority on opt-in rates. In the case of the Cambridge agreement, the proportion of corresponding authors opting in was consistent across career phase. In the case of Wiley, assistant professors had higher opt-in rates than either their senior or junior counterparts. These data do not suggest junior scholars are more cautious about OA publishing than senior scholars. Additionally, the slightly lower rate of opting out among senior faculty publishing in Wiley journals is so small that it does not suggest conservativism among senior scholars. Rather, what is evident is that as recognizable publishing entities flip to OA models that do not charge authors, researchers are happy to make the content available. Anecdotally, we have heard far fewer statements from local researchers suggesting they think OA journals are inherently lower quality or predatory—and indeed, it is hard to see how that idea could flourish with widespread conversions to OA and increasingly visible hybrid OA opportunities in well-established journals across the disciplines.

The primary limitations of this study are that it is focused on two journal publishers at a single institution over a limited time period. Although the results suggest broad success of the agreements locally and the importance of similar agreements within and beyond the consortium for co-authored output, it does not mean these agreements are without risk or that the APC model, even when funded by the library, is necessarily favored by scholars. Indeed, local participation in a recent Ithaka faculty survey indicated strong support and preference for subscribe to open models where libraries directly support diamond OA infrastructure and journals rather than paying per-article costs.[21]

When libraries enter into these agreements, it is important that they work with journal publishers to improve opt-in messaging clarity, initial opt-in workflows, and retrospective opt-in options, and that publisher partners be willing to hear the feedback. Workflows and uptake with both publishers have improved since the beginning of the two agreements, and the difference can be seen particularly in the first and second year of the Cambridge agreement. Changes to the Wiley agreement to allow a longer window for retroactive opt-ins will likely help. Although the opt-out rate decreased during the pilots,

there is an opportunity to identify and understand reasons behind opt-out decisions beyond discipline and seniority. These reasons may be workflow based, stem from a lack of understanding, or be due to a variety of other reasons.

Our experience has been that authors are very sensitive to requirements for direct payment; shared payment models (where an APC is split between the library and the researcher) or APC discount models have not driven interest. To this extent, discounts offered by publishers for gold OA journals in addition to waiver programs for hybrid journals may not produce much interest in gold journals. It is not clear from the Cambridge second year that the waiver program itself pushed researchers to submit to more Cambridge journals. We consider it most likely that researchers will continue to make journal choices based on journal reputation and—in disciplines where they are used–impact metrics, despite being happy to take advantage of the library's OA agreement and its APC waivers. As more publishers adopt transformative agreements, more research will end up OA, but the agreements may not push researchers to those publishers from journals without such agreements barring limited cases of funder requirements.

Conclusion

This study documents the broad success of two transformative agreement pilots at a large research university and argues that the growth of such agreements could help transition a broad proportion of research to OA at the university and within the consortium. The success of these agreements was true across disciplines and stages of career seniority. The results do not necessarily mean, however, that such agreements are the only or preferred model for OA. Some librarians, funders, and even publishers themselves have suggested that under-resourced institutions as well as institutions in the lower income countries may end up unable to participate, with transformative agreements extending a problem with the APC of shifting the cost of publishing from readers to authors.[22] The impact for some under-resourced institutions may be offset by their inclusion in consortial negotiations. A great deal of the feasibility and burden depends on the model of the particular publisher, however, and in some cases costs may go down for low-research institutions with the burden going up for research intensive institutions, as with the ACM model introduced after the period of this study.

Further analysis of the uptake and impact of transformative agreements at a broader scale in a US context, where there are not national-level agreements in place, would be useful. Additionally, as libraries develop approaches to OA funding that supports various models including transformative agreements and direct funding of OA journals or infrastructure, ways to analyze the impact of other forms of OA support will also be important. Such analysis would need to balance benefits to specific institutions with the general benefit to the scholarly communications ecosystem that may have important but more indirect implications for local researchers.

Acknowledgments

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Notes

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NOTES ON OPERATIONS

Experimental Approaches to Transforming Academic Library Print Collections

Shari Laster, Lorrie McAllister, Emily Pattni, Tammy Dang

As academic libraries renovate their facilities, often seeking to reduce print collection footprints within public-facing service areas, there is an opportunity to develop new design strategies and methods for print curation that meet the needs of the communities served by these libraries. In alignment with a major renovation, ASU Library developed a community-focused approach to academic library print collections, providing opportunities to engage and inspire them to create new knowledge and foster an overall sense of belonging. As part of a grant-funded program, ASU Library created eight experimental projects that explored the ways in which people engage with books in print, which led to new collaborative methods for developing print collections for the post-renovation reopening of Hayden Library, ASU's largest library on Tempe campus. This work has resulted in improved knowledge of effective workflows and communication strategies to enhance engagement with print collections, becoming a signature library program to co-develop inclusive featured browsing collections with university and community partners.

Arizona State University (ASU) Library published a white paper in 2017, arguing that the time had arrived to transform book collections within academic libraries to become more effective tools for fostering engagement with library users.[1] While digital access has revolutionized how scholars and learners interact with information resources and enabled the reinvention of library spaces, we contend that the potential for using print collections as a tool to enhance the twenty-first century academic library has not yet been realized.

Academic library print collections remain an important part of the scholarly research process, particularly for graduate and faculty researchers, and may also serve as tools for learning and creative inquiry for all library users. In addition, print collections may serve other functions within the educational ecosystem. Books may be explored and interpreted as objects; and print volumes on shelves are a visual presence in library spaces. Conceiving of the circulating book stacks as a flexible user-focused service opens new possibilities for how we as library professionals develop, manage, and present print books to library users. The white paper articulated goals for academic libraries that include proactive and "consciously chosen" print collection management, new approaches to collections curation that reflect cultural breadth, and inclusive community engagement with collections in print across the curation lifecycle. By focusing on "open stack" print collections, academic libraries can leverage existing holdings at any scale, test new approaches to collection development at relatively low cost, and encourage engagement with anyone who encounters library spaces.[2]

Shari Laster (shari.laster@asu.edu), Head, Open Collections Curation and Access, Arizona State University. **Lorrie McAllister** (lorrie.a.mcallister@hofstra.edu), Dean of Libraries, Hofstra University. **Emily Pattni** (emily.pattni@csn.edu), Elearning Librarian, Lead Librarian for the North Las Vegas Campus Library, College of Southern Nevada. **Tammy Dang** (dangtammyt@gmail.com).

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Following the white paper research, Lorrie McAllister, then associate university librarian for Collections Services & Analysis, began elucidating a set of ideas that informed a local strategy of inquiry for print collection design and development at ASU.[3] The ideas included:

- print collections can be used for engagement, not just for access;
- academic libraries should leverage print collections for engagement within our spaces;
- traditional notions of "open stacks" should leverage the spirit of the open education and open access movements, including participatory practices of collection development that engage library users;
- transforming print collections means that we are asked to explore transforming our operations and methods for book selection, presentation, and management; and
- print collection curation should employ a critical approach to selection, acquisition, description, and management to enable more inclusive library practices, processes, and collections.[4]

As part of the three-year "Future of Print" initiative funded by The Andrew W. Mellon Foundation, ASU Library explored and tested many of these ideas within our local context. In particular, we were faced with the renovation of the Hayden Library, the largest library on Tempe campus, which necessitated new designs for print collections on four of the library's five floors. Our goal was to plan for a library that incorporated print collections as part of its space design, within the context of a dynamic contemporary institution of higher education. To achieve this goal, we pursued two lines of inquiry that stemmed from the ideas emerging from the 2017 white paper. One track, discussed in the narrative that follows, led to the creation of a set of experimental projects that helped our collections project team learn about print collection engagement across multiple aspects of our collections work. We were able to incorporate the results of most of the projects into the final collections design for Hayden Library, and use what we learned to initiate a "featured collections" program that continues to generate engaging displays within our public-facing service areas. The second strategy incorporated the use of available data to develop an informed and user-centered design approach to a massive open stack research collection.[5] Together, the strategies and methods we developed allowed us to explore new approaches to collections work that we could carry into our future operational endeavors.

Project Context

In 2016, Michael Crow, President of Arizona State University, called for a "fifth wave" of higher education for institutions to prioritize the "production, synthesis, and storage of knowledge" using emerging technologies.[6] Crow contended that by using scalable and innovative strategies, institutions can and must evolve to meet the needs of 21st century learners. Arizona State University has since grown toward this aspirational goal, becoming a comprehensive public research university with an institution-wide commitment to excellence, access, and impact.[7] As of 2023, ASU Library serves approximately 145,000 undergraduate and graduate students across five campuses, including students in both online and residential programs. These students represent a diverse range of social, economic, and cultural backgrounds and identities. Additionally, the Library serves nearly 5,000 faculty across 17

different colleges and schools, along with researchers, instructors, staff, and emeriti. The Library also supports students in ASU's non-degree programs such as the Global Freshman Academy; prospective students and K-12 students within the region; alumni and donors; people residing in places where ASU campuses and satellite locations are placed or planned, such as the Los Angeles and Washington D.C. locations; current and future Arizonans, and those seeking to understand the Peoples, cultures, and histories of the southwest.

In 2017, Jim O'Donnell, University Librarian for the Arizona State University, presented at the Charleston Library Conference about the future of print at colleges and universities.[8] He spoke of books as objects of engagement that foster critical thinking and spark curiosity. This speech contained the seeds of what our team would grow into the "future of print" initiative at ASU, ultimately informing a major library renovation project. We sought to reimagine and then create library spaces where print collections are an active participant in 21st century library space design and brought to the forefront and spotlighted as one of our central services.[9]

ASU received planning grant support from The Andrew W. Mellon Foundation for The Future of the Academic Library Print Collection project to define issues and options affecting the design of the next generation of print collections for academic libraries. ASU hosted a workshop, inviting a cross-section of colleagues from across multiple institutions, including ASU, Massachusetts Institute of Technology, Cornell University, and the University of Arizona. Based on the findings from this workshop, ASU Library developed a white paper outlining a vision for the future of print collections in academic libraries.[10] The completion of this paper was followed by a $380,000 implementation grant from The Andrew W. Mellon Foundation. The grant allowed the Library to assemble a project team in the summer of 2018 led by associate university librarian, Lorrie McAllister and including data analysis specialist, Tammy Dang, and curation specialist, Emily Pattni, with project coordination from Shari Laster, then head of Open Stack Collections. McAllister led this initiative, seizing the opportunity to experiment with new collection design strategies that encouraged and responded to user engagement within twenty-first century library spaces.

Literature Review

Recent literature on encouraging browsing and interaction with academic library print collections reflects an unsettled landscape of purpose, methods, and outcomes for projects similar to ours. With profound transformations in information-seeking behavior, the rise and subsequent fragmentation of social media platforms, and shifting demographics of students enrolled in higher education, engagement with print collections in academic library settings often receives at most only peripheral treatment in the literature.[11] With pressures in physical space planning, the footprint of extant print collections is often understandably positioned as a problem to be managed.[12] Meanwhile, broader trends within academic collection development engage a range of issues, including openly-accessible content, specialized and archival collections, continued refinement and change with e-books, including demand-driven acquisition programs, and shared collection development and management strategies.[13]

These and other factors suggest the opportunity to specify, reframe, or reconsider goals for academic library collection development.[14]

Changing priorities in academic research libraries, including a greater breadth of support services, led to a decreasing emphasis on browsing collections that had often served as the most visible encouragement for recreational reading.[15] Librarians argued that this trend undermined efforts to encourage reading among undergraduate students, though some also expressed hope that electronic browsing would become in some way equivalent to the in-person browsing experience.[16] The rise of the "One Read," or similar campus- or community-wide programs that highlight a book as the focal point for academic programming over a given period of time, became one way to challenge this trend; displays, paperback exchanges, and book reviews have also been recognized as strategies that can complement or supplant browsing collections.[17]

Although the practice of developing display collections for patron browsing has existed for many years, recent literature indicates that creating book displays remains a key strategy to encourage the use of print collections. For example, one library launched a book display program to raise awareness of books promoting diversity in partnership with the institution's office of multicultural affairs.[18] This book display led to an increase in collection use and provided an opportunity to cross-promote multicultural programming on campus.[19] Matching displays to user interests also shows potential. At a religiously-affiliated university library, religious fiction placed on display alongside religious non-fiction circulated more than the non-fiction, and more than similar fiction that was available in the stacks; the authors noted that the display was most successful when the materials available were focused on religious fiction and non-fiction.[20] Similar success was shown with a leisure reading collection focused on light reading and escapist themes that was developed and maintained for a consumer health collection at a health information library located within a medical center.[21]

Displays alone do not always lead to a significant increase in the circulation of print collections. Following a transition into library compact shelving, a business library pursued a strategy of creating displays to encourage usage, taking into consideration elements of visual appeal including display shelving and cover design; circulation increased for the displayed titles, but there was not an overall increase in circulation of print materials.[22] One research article looking at the phenomenon of stacks "frozen in time" as their acquisitions switched to an electronic-preferred strategy noted that while usage of the print collections dropped, it did not do so at a rate that would indicate e-books as fully substitutable for print, which may indicate that the newest e-books are invisible to library patrons.[23] While some factors about print collections usage are outside the control of libraries, it is helpful to consider that books can be a source of interest without leaving the building. A four-year study at a small private university found that in-house use is a valuable indicator of print collections engagement; data from this study also showed that highly visible and browsable collections demonstrated greater usage than traditional stacks arrangements.[24]

Emerging approaches to outreach for academic library services also offer potential lessons for collections work. A recent content analysis study exploring the definition of "outreach" for academic

libraries suggests that programs intended to increase collections engagement may be appropriate to consider in this category.[25] The author's synthesized definition describes outreach activities as the "design and [implementation of] a variety of methods of intervention to advance awareness, positive perceptions, and use of library services, spaces, [and] collections. . . . Methods are primarily targeted to current students and faculty, however, subsets of these groups . . . can be additional target audiences. In addition to library-centric goals, outreach methods are often designed to support shared institutional goals such as lifelong learning [and] cultural awareness."[26] In light of this definition, a collections program prioritizing meaningful engagement and collaboration with diverse groups, leading to the creation of displays that reflect community perspectives and interests, may be positioned as a form of outreach.

Situating collections engagement in alignment with outreach efforts encourages the use of metrics for success that go beyond circulation. In considering the messaging impact of collections programs, it is helpful to note that outreach efforts communicating clear and strategic messages to the communities served may themselves act as markers of value to stakeholders.[27] This suggests that featuring thoughtfully selected collections materials may support desirable messaging about the institution's priorities. Additionally, framing engagement as a cycle of relationship management highlights the importance of collaborative and mutually respectful partnerships in developing and sustaining services.[28] For institutions that prioritize values including justice, equity, inclusion, and accessibility, building relationships in support of inclusive collection development has the potential to enact their commitments to support marginalized communities.[29] Aligning collection development with the service priorities of the institution has an additional long-lasting impact. Materials collected now will become a part of the ecosystem of scholarly works available to future researchers, demonstrating to them the priorities of today. The literature suggests that print collections can be designed to effectively convey messages about the ways in which a library aims to serve the communities that regularly encounter their spaces, while providing a needed service that is relevant to stakeholders.

By orienting collections work toward a "collections as service" model, libraries are able to more explicitly center the needs of the communities they serve as they consider resource allocations and priorities. A collection assessment at a very large research university undertaken as part of this model opened the door to a suite of changed practices, including loosening circulation limits, extending loan periods, and expanding collections eligible for resource sharing.[30] Another institution sought to develop methods for an impact analysis of how library collections may support curricular goals for diversity, equity, and inclusion related courses.[31] These approaches show potential lessons for collection development; collecting print works outside the traditional scope of scholarly monographs is a responsive practice if doing so aligns with user needs. Understanding those needs can take many forms. Both observational information and community data can be used to inform curation of collections in library spaces; and seeking direct feedback from patrons is an easy way to ensure that additions to the collection reflect community needs.[32] This input can also be gathered more formally; in taking a more proactive approach to print collections, a case study building on the ASU Library white paper

incorporated faculty input and interviews to develop engagement programs and provide input to the library's strategic planning process.[33]

Our methods of active experimentation sought to explore different ways to connect people with books, with a goal of broadening the strategies available to collaboratively engage with key partners and stakeholders. Many of the themes described above resonate with the experiences of the project team, including those emphasizing alignment with community needs and interests, and those identifying positive outcomes for collections programs that extend beyond increased circulation statistics.

Methods to Experiment for Engagement

One hypothesis described in the white paper is that engagement with users is the key to activating print collections in the digital age. To investigate this hypothesis, we held several informal student focus groups at the start of the initiative to learn about how students at ASU use library resources, including spaces, programs, and collections, and how they think we might better support them. Participants shared that they would most likely spend time exploring library book collections for an assignment or some other academic purpose. Our focus group results showed that while occasionally students may try to find a book for pleasure reading, they noted that library books are not organized in a way that encourages this type of exploration. Students told us that they did not always know about our programs and resources even if they regularly visited the library.

With the assistance of many small task forces composed of personnel from across the library, we prepared a series of experimental projects over the first two years of the initiative that were intended to explore ways in which people engage with books in print.[34] The experiments were chosen based on a card sorting exercise, with cards representing a library location, user group, and method that informed the experiment process. The cards were sorted into ten experiments that the project team then investigated for feasibility and availability of community partners; ultimately, eight experiments were completed and are described below. Each experiment revolved around a print collection with themes or books selected by different ASU affiliates and groups, where we considered different ways to select, organize, present, and contextualize the collection.

The experiments derived from the card sorting activity covered a variety of selection, presentation, and engagement methodologies. When possible, experiments also included a collaborative element, which allowed our team to highlight relevant research and personal interests, uplift the voices of people who have been underrepresented in academic libraries, and employ new design strategies to connect with all who use our libraries. Below we list the eight experiments followed by a short description of the factors used to specify the experiment.

- "Surprise Me!"—An experiment to see how students respond to and interact with books shelved in non-traditional ways.
- "Collecting Collections"—An opportunity for ASU communities to reflect on collecting practices and share their own collections.

- "Health Humanities Horizons"—A collection of books, DVDs, and CDs chosen by faculty from The College of Liberal Arts and Sciences, the College of Health Solutions, the New College and the Nursing College.
- "¡Vamos Argentina!"—A series of lectures, art installations, and demonstrations highlighting aspects of Argentine culture while drawing attention to the Library's collection of Argentine literature in print.
- "Barrett Honors College Little Library"—A "take one, leave one" book collection to support student interactions with books outside of library spaces.

Figure 1. Books shelved spine-backward in "Surprise Me!"

- "Visual Bibliographies"—A closer look at the research process that highlights faculty publications and interviews.
- "Dust and Shadow"—An immersive audio and print experience of the southwest desert.
- "Untold Histories"—A collection of books chosen by students to represent their cultures and backgrounds, with testimonials to encourage others to tell their own stories.

Each experimental collection was displayed in its selected location for a given period of time with ASU Library branding for the "Future of Print" initiative, and descriptive information inviting exploration and feedback. We also took steps to better understand how we could assess user engagement with these materials, beyond the analysis of circulation data. If we were conceiving of print materials as engagement tools, we wanted to consider additional ways to measure this engagement. By including various assessment mechanisms with each experiment, we were able to compare different levels of user engagement with print collections.

Experiment Summaries

Our first series of experimental projects explored ways to initiate engagement around books. The "Surprise Me!" experiment arranged volumes of modern poetry spine-backward on a small browsing shelf in our library on ASU's West Valley Campus. The idea behind this experiment was that poetry as an art form can present unexpected surprises, much like a book shelved unexpectedly spine-backward can also surprise library users. Our assessment showed that this display did, in fact, raise confusion! As this was the first book collection of its kind, we were able to more deeply consider and operationalize the decision-making behind selecting, moving, arranging, and displaying books outside of our current

practices. This project also served as a test run for new workflows involving other teams, including the communications team and circulation staff.

Figure 2. "Health Humanities Horizons" included books and DVDs selected by faculty in support of a new certificate program.

In "Collecting Collections" we arranged books about various forms of collecting in a bookstore-style display. The display was designed for the lobby of Hayden library that remained open during renovation, which gave library visitors a sense of how we were changing our book display methods while inviting library personnel to participate in our experiments. We showcased images of personal collections of library staff alongside books about collections, arranged amid 3D-printed models of collectible objects. The purpose was to invite visitors to reflect on their own collections and collecting interests through a variety of interactive elements. A guestbook demonstrated that visitors engaged with the display and explored the books, which speaks both to its playful theme and its inviting design.

The "Health Humanities Horizons" experiment allowed us to co-curate a collection of books that examined health issues through a diverse lens of social, religious, cultural, or historical contexts. This effort also raised awareness about a new Health Humanities certificate available at ASU. The process of working with faculty to develop the browsable collection cultivated closer relationships between those faculty and library personnel. Leveraging this group of learning resources displayed in the Downtown Phoenix Campus library location helped us establish new partnerships across additional schools and centers.

The underlying theme for the "¡Vamos Argentina!" experiment was to seek alignment between library programming and collections. Organized in conjunction with the planned residency of Argentinian artists Guillermo Faivovich and Nicolas Goldberg, the Library hosted six events, including lectures, yerba maté tastings, and tango lessons. While the events attracted some attention, we concluded that the relationship between programming and collections engagement remained tenuous, in that programming did not result in a significant increase in collection usage, though the experience strengthened important relationships with collaborators.

Our team also worked with the Barrett Student Ambassadors, a group of students from the Barrett Honors College who were hired to work closely with the Library to help build research skills among their peers. Together, we installed a "little library" inside the Honors College at Tempe campus, inviting

students to take a book that they want to read and leave a book to share. Our project team seeded this library with used books (not from library collections) recommended by students. We also met with the Ambassadors and other library student workers on their paid time to hear their ideas on themes and books to include in new collections, and solicited suggestions from students outside the library through tabling events, online submission forms, and focus groups.

In the second year of our project, we focused on collaborative methodologies for developing small browsable collections. The "Visual Bibliographies" project featured publications of four faculty from different academic schools on campus. For each collaboration, we used the bibliography from the scholar's most recent book to gather cited books, journal articles, and archival reproductions into a single collection to show how much goes into writing a scholarly monograph. We also conducted interviews with each professor to learn more about their research process and their engagement with library resources. These interviews were presented on kiosks next to the collections, allowing for multidimensional engagement with outputs from the research process.

Figure 3. Books played a prominent role in the temporary installation of an "acoustic ecology salon" space.

"Dust & Shadow" was an ambitious project initiated by the fledgling Desert Humanities Initiative, with support from ASU's Institute for Humanities Research. A "desert salon" was installed in a library study room, with an immersive audio, visual, and sensory experience of the southwest desert, imagined as a "Solarpunk" waystation that enacts a sustainable and diverse future interweaving community and nature. The power of the desert sun inspired a "punk," or alternative reading of a library study space. Our team partnered with the project investigators to select print books from a bibliography of inspirational works, which we displayed as an integral part of the art installation.

We also partnered with student workers from ASU Library's Community-Driven Archives initiative to design a collection that they called "Untold Histories." Established in 2017, ASU Library's Community-Driven Archives (CDA) initiative builds strong relationships with historically marginalized communities in Arizona and the southwest region, supporting collaborative training and empowerment for community archivists in the Phoenix metro area.[35] The students, many of whom identify as People of Color or/and members of the LGBTQ+ community, selected books that shared stories

about lived experiences from communities that were personally meaningful to them. They also led a complementary event inviting other students to record their oral histories. Their goal was to create an opportunity for members of the ASU community to reflect upon their own identities and tell their own stories. The collection was visually appealing with a bookstore-style display incorporating images of the students who participated. Students later shared that they felt empowered, represented, and proud to work with the Library on this project. They shared their work on the project with their friends and families, too. Responses to this collection became a driving force behind our work moving forward to support and empower students, including student workers.

Assessment

Our measures of success for experimental engagement encompassed both traditional metrics and other approaches to considering engagement. Engagement with collections can be reflected with circulation data, including in-house use data, but we also wanted to see if there were other measures for engagement that could indicate the relative success of various efforts to connect collections with people.

As a traditional metric, we examined circulation data, first exploring and then looking beyond the percentage of the collection that circulated during a given period. Factors such as item location, publication date, acquisition date, and loan history allowed us to see the impact of highlighting books through these small collections. For example, older books taken from our off-site storage facility tended to see greater overall usage when placed alongside newer books in a high traffic area. New books purchased for these collections also saw greater usage, which may reflect the fact that we retained the dust jackets to maximize visual impact of the book and attract interest.

We also looked to other assessment mechanisms that could be roughly comparative between the experimental collections. Aside from circulation data and site visits, we asked visitors to rate book displays by placing an emoji sticker on a board that represents how they feel about the collection. We chose this form of assessment because we thought it would be both fun and easy for library users to participate. Stickers were interpreted based on a Likert scale to gauge levels of interest:

- 😕 1—Participant has a low level of engagement or finds the presentation unsatisfactory.
- 😐 2—Participant is indifferent to the display. They might not like the display or care that it is there.
- 🤔 3—Participant is engaged to the point of thinking about the contents of the display. We interpret this as the display being either confusing or thought-provoking.
- 🙂 4—Participant is engaged and likes the display.
- 😍 5—Participant is very engaged with the display and may be inclined to check out future library collections.

Although there could be multiple meanings behind a single emoji, the number of stickers on the board showed the amount of participation relative to the other experimental projects. Anecdotally, we found

that students enjoyed this form of response as it allowed them to engage with the collection even if they did not check out a book. (To be fair, we also had a few stickers escape the library and show up in other campus locations.) This was a quick, easy strategy to learn how many people were engaging with a collection.

We embedded other assessment mechanisms into each experiment to measure the extent of engagement with the project. For example, we noted how many people attended events, how many promotional bookmarks were picked up, or how much interest was generated by news stories on the Library website. We also took note of the interest on the part of our collaborators in participating in a future partnership.

Engagement and collections usage varied widely from project to project, which suggested to us that there is no "one size fits all" approach to increase engagement. Although only around half of our experimental projects included purchasing new titles for the collection, we ultimately came to consider the extent to which a featured collection led us to add to the library's holdings as an important metric for success. Purchasing titles for a display also adds to the richness of our collections, which remain part of the Library indefinitely. By engaging with community members who are willing to tell us what they would like to see on our shelves, the titles we acquire shift toward a more diverse range of themes, authors, and perspectives.

Discussion—What We Learned

The aspiration of ASU's 2017 white paper "The Future of the Academic Library Print Collection: A Space for Engagement" was to motivate ideas that transform library spaces to engage users more effectively. ASU Library's subsequent experiments to explore both community-engaged and data-informed selection processes brought the ideas from the white paper into a practical, local context for further investigation. Early findings in our project demonstrated that data-driven collections work and community-centered engagement have limited overlap, and this result was sustained throughout our project.

Although we began our work looking at institutional demographic data and library bibliographic and circulation data, we eventually recognized the need to reconceptualize what it means to use data for collections work, and how engagement can inform selection processes. While institutional demographics provide context for collections planning, demographics cannot effectively direct our work with community-centered engagement, because data alone do not indicate how communities are open in different ways to engage with the library. In other words, knowing more about the ASU community at scale, and knowing more about those who already use our print collections, cannot tell us who is willing to partner with us to build better collections, or who would use our collections more—if only we had the books that interested them!

We affirmed that close partnerships depend on relationship development and trust-building, which is demonstrated through integrity and consistency between what library personnel say and what they

do. Among the many benefits to the time invested in these partnerships, we saw an enrichment of our overall holdings; these additions to our collections are then reflected in future collections work. Also, collaborations should begin at the earliest stages of planning to build trusted relationships from the outset. The team learned that it is essential to build interconnected workflows and services across library teams to accomplish project planning, implementation, and assessment. A key takeaway from our work is that informed decisions about library print collection development cannot be made in isolation from the people who use our collections, along with the library personnel who create, describe, manage, and store our collections.[36]

Our greatest challenge in exploring engagement with collections has been to understand how to build relationships that result in effective collection development. Based on initial larger-scale outreach failures to engage ASU constituents, we decided to instead leverage pre-existing relationships with faculty and student groups. For example, by having the Barrett Student Ambassadors, who already worked closely with the Library, take the lead on the selection and communication of a "take one, leave one" display in the Barrett Honors College, it was easier to get student participation and manage the collection despite it not being in a library space. This was a great example of leveraging an existing trusted relationship to accomplish a print collections project.

Projects that involve complex partnerships such as the immersive desert salon designed by the Desert Humanities Initiative require library-wide coordination. After an initial meeting with collaborators, we reached out to Library units that would be needed to support the project. We worked closely with the Library's communications team, which is responsible for signs, design elements, and event planning. We also required the help of the technology team to set up videos and microphones, frontline services staff for directional assistance, and operational staff for logistical support. We sought to identify and secure a location that would be highly visible and accessible to the intended audience for the project while ensuring that events and programs were not in competition with other library offerings. By initiating coordination early in the process, we intended to foster a spirit of collaboration and communication. At the completion of the experimental project, we compiled and published summary reports on our project website. Through the events, reports, and collections, we strengthened our network for outreach and communication within the Library and demonstrated that the library can be a partner in experimental humanities research.

Overall, our project resulted in better understanding of the staffing needed for open stack curation work, which must be integrated with library operations, analysis, and engagement. Collaborating with liaisons and community stakeholders to develop featured collections is "high-touch" in that it requires knowledge of cooperative and technical processes that need to be accomplished in close communication with stakeholders. This role requires specialized experience with library resources and workflows to coordinate internal library operations and ensure ongoing success of our print browsing program. Liaison librarians generally do not have the time or operational experience to handle these responsibilities, so the approach we piloted is to partner with liaison librarians to accomplish these projects. The engagement work we undertook shows that both listening and trust are important to our

communities and that over time, we can build meaningful relationships that inform print collections curation.

Next Steps and Future Directions

Our experiments led to the development of a new program for "featured collections," or collections that are the product of collaborations between the Library and our communities to create meaningful learning and engagement experiences using print and digital resources. Defining characteristics for featured collections include community collaborators, such as student organizations or faculty, and interactive elements including dust jackets or digital media. We are also able to continue conducting periodic assessments of the collections based on usage data, user feedback, and other mechanisms.

The collections experiments also shaped a workflow for the design and selection of our concourse classroom collections. The first phase of the Hayden Library renovation was reopened to the public in Fall 2019, introducing seven new library classrooms. These university-scheduled classrooms presented an opportunity to connect with students and faculty. Beginning in Spring 2019, four liaison librarians identified instructors scheduled to teach Fall 2019 semester courses in these new classrooms, focusing on classes that represented interdisciplinary topics such as Adolescence (CDE/SOC 312) or Southwest Before the United States (SLC 194). Some liaisons opted to strengthen existing relationships, while others took the opportunity to establish new connections with instructors they had not yet worked with. Each instructor was invited to participate in designing a collection related to their course topic. The books, DVDs, and other resources selected by the librarians and instructors represented a wide range of scholarly and popular resources, with a goal to make each collection appealing to students who would pass by the collections on their way to class. We repeated this collection design process in advance of the Spring 2020 semester, which coincided with the reopening of Hayden Library in January 2020.

In the final year of this grant-funded project, two of the project staff moved on to new opportunities. However, the successes of the project team have informed staffing decisions for ASU Library, as we seek to continue building engagement with print collections. Despite some disruption to interest in print collections resulting from the global pandemic that followed the work described here, the potential for using print collections as a tool to enhance the twenty-first century library can continue to be explored and realized. Academic libraries have the opportunity to make use of spaces and collections in ways that enhance their missions and further open their doors to the communities they serve.

Notes

1. ASU Library, "The Future of the Academic Library Print Collection: A Space for Engagement," Arizona State University, October 2017, https://hdl.handle.net/2286/R.I.50125.
2. At ASU Library, our open stack collections include millions of print and openly-accessible digital materials for all to explore and use. Here, we focus on the print collections that are openly available to browse within library public spaces.

3. For a detailed exploration of conceptual underpinnings and implications of the open stacks model, and further exploration of these ideas in their mature form, see Lorrie McAllister, "The New Open Stacks," in *Transforming Print: Collection Development and Management for Our Connected Future*, edited by Lorrie McAllister and Shari Laster (Chicago: American Library Association, 2021), https://hdl.handle.net/2286/R.2.N.160096.
4. For methods and results emerging from this project, see Lorrie McAllister, et al., "Enhancing an Academic Library Renovation Project with Creative Open Stack Print Collections Services," Arizona State University, June 2024, https://hdl.handle.net/2286/R.2.N.194545.
5. This strategy and associated methods are discussed in McAllister et al., "Enhancing an Academic Library Renovation Project."
6. Michael M. Crow, "Launching the Next Wave in Higher Education," March 7, 2016, SXSWedu, Austin, TX, https://www.youtube.com/watch?v=4o-evzaz7d8. See also Michael M. Crow and William B. Dabars, *The Fifth Wave: The Evolution of American Higher Education* (Baltimore: Johns Hopkins University Press, 2020).
7. See Michael M. Crow and William B. Dabars, *Designing the New American University* (Baltimore: Johns Hopkins University Press, 2015).
8. James O'Donnell, "The Future of Print in Open Stacks: A Proposal," November 8, 2017, Charleston Library Conference, Charleston, SC, http://www.youtube.com/watch?v=Go4GJCYCLqk.
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Book Review

Michael Fernandez, editor

Curating Community Collections: A Holistic Approach to Diverse Collection Development. By Mary Schreiber and Wendy K. Bartlett. New York: Bloomsbury Libraries Unlimited, 2024. 328p. $60.95 softcover (ISBN 978-1-4408-8098-8); $54.85 ebook (ISBN 978-1-4408-8099-5).

In today's libraries, the focus on diversity, equity, and inclusion (DEI) is more than a goal; it is an essential practice for building collections that truly reflect the communities they serve. *Curating Community Collections: A Holistic Approach to Diverse Collection Development* provides a timely and comprehensive guide for librarians and staff, regardless of their experience level. This book reinforces the idea that libraries and their collections can drive significant social justice initiatives while also offering practical tools and insights for librarians ready to embrace this important role. If you do not already see your library as a force for social change or as DEI advocates, this book will certainly make you reconsider. As Schreiber and Bartlett assert, "We believe libraries are uniquely positioned to effect real change in contemporary society" (18).

The book is divided into three parts, methodically encouraging a holistic approach to creating a comprehensive framework for overhauling current methods of integrating DEI into library collections—a framework born from the authors' frustration with traditional approaches that have repeatedly fallen short. Both emphasize early on that their frustration with current DEI practices "was not a collection problem" (8), but a cultural one that demands both an overhaul and broader dissemination.

In part 1, "First Steps," the authors set the stage by examining the deep-rooted history of privilege and exclusion in libraries, highlighting the ongoing efforts to challenge these systemic issues. The authors want readers to understand how libraries have historically been a powerful entity in perpetuating societal biases. In doing so, we are encouraged to reflect on and dismantle these long-standing biases. In chapter 2, "The Role of the Diversity Audit," the reflection continues by addressing these biases with a practical guide, cautioning that while diversity audits provide essential data, they have their limitations and should be seen as a starting point, not an end in and of themselves. Despite being part of a well-resourced, forward-thinking library system, both authors found that diversity audits often offered only superficial solutions. Building on this, chapter 3, "Selecting a Diverse Collection," stresses the importance of prioritizing quality over quantity when diversifying collections, with a deliberate focus on community authenticity explored through cultural humility. For any reader interested in weeding collections, chapter 4, "Weeding a Diverse Collection," provides best practices, which can be particularly challenging when considering diverse perspectives within the community and library administration. However, it is somewhat generic in its approach, and while the authors acknowledge that it may create friction, the reader would benefit from additional cautionary guidance on navigating these potential pitfalls. Guidance such as providing stories from others who have faced similar challenges and how they overcame them, demonstrating that attempts may not be successful the first time—and why that is okay. Overall, the first part sets the tone that DEI is a cultural demand and raises important questions: Are

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diversity audits having an actual impact? What do these actions mean to you or the community? Does the focus remain on numbers and statistics, or is there a deeper strategy at play?

The next part of this book transitions into a more community-driven, engagement-centered initiative with the title, "Community Collection Approach," where the authors connect their holistic internal assessments and strategies with the practical implementation of DEI principles through collaborative efforts both within and beyond the library. Part 2 is ideal for readers looking to expand their expertise and efforts through partnerships, while also reflecting on whether current initiatives might be hindering community connections. The goal is to better align with communities' needs and expectations and to strengthen engagement with overlooked users of the library. Chapter 5, "Community Collections Curation," goes into the topic of floating collections. The authors first define what a floating collection is and briefly explain how it came to be, but then ask the question if floating collections can inadvertently favor more privileged communities. Chapter 6, "Satellite Community Collections," is more relevant to larger institutions, well-funded public libraries, or those with strong community partnerships, as these efforts require significant resources and commitment that may not be feasible for all libraries. "Connecting with the Community," the following chapter, provides valuable insights on how libraries can proactively engage with their communities, better understand their needs, and ensure their collections and services reflect these needs. This chapter may be particularly useful for those looking to justify evaluation of a traditional policy or collection and to develop a strategic plan. Chapter 8, "Sharing Your Success: Community Collections and Stakeholders," concludes that transparency and communication with stakeholders are important in community collections. It provides a roadmap for translating diversity audit findings into tangible progress, emphasizing that DEI is an ongoing commitment that requires continuous evaluation, adjustment, and support.

The third and final part, "Considerations Beyond Collection Development," recognizes that the success of DEI efforts depends not only on external community engagement but also on the commitment and capacity of library staff and leadership. Chapters 9 and 10 delve into the complexities of diversifying collections, underscoring that DEI work is not just a task but a fundamental shift in how the library operates. Chapter 9, "Helping Staff Be Successful," offers valuable guidance for managers and leaders who are responsible for navigating their teams through the often challenging process of implementing DEI principles. While chapter 10, "Defending Our Communities' Right to Read," emphasizes strong collection development policies and solidarity among librarians, it also touches on the real-world challenges librarians face, such as dealing with virtual attacks related to banned books. The stories are only a glimpse into these challenges, so the reader should not expect a step-by-step approach. Instead, readers will gain practical insights, recognizing that handling such issues often requires tailored, situation-specific strategies and ongoing support from others. This underscores the need for ongoing vigilance and flexibility in DEI efforts, as introducing a more holistic approach can sometimes be met with resistance or dismissive responses when traditional methods are questioned.

Overall, *Curating Community Collections* is a starting point for librarians who want to integrate DEI principles into their collections but who may be stuck or unsure of where to begin. The book combines a

solid theoretical framework with practical and strategic steps, encouraging readers toward meaningful change through a well-rounded approach that emphasizes community input, clear DEI objectives for positive impact, and an understanding of the cultural and historical contexts relevant to social justice. There is practical advice and real-world examples at the end of each chapter titled "Perspectives from the Field" and "CCC Toolbox," offering real-world insights from librarians across various backgrounds—public, school, academic, and special libraries—and additional readings. While the book may not address every possible scenario, it highlights the most critical aspects of DEI work and provides practical tools that can be immediately applied.—*Michelle Navarro (msnavarro@cpp.edu), California State Polytechnic University, Pomona, California*

Book Review

Michael Fernandez, editor

Inclusive Cataloging: Histories, Context, and Reparative Approaches. Edited by Amber Billey, Elizabeth Nelson, and Rebecca Uhl. Chicago: ALA Editions, 2024. 296p. $64.99 softcover (ISBN 979-8-89255-566-1).

The introduction of *Inclusive Cataloging: Histories, Context, and Reparative Approaches* sets forth two aims: "to record the efforts of so many librarians who have worked to improve our systems and collections, as well as to inspire those who have yet to enact change that this work is scalable, possible, and necessary" (x). Editor Amber Billey observes that the "racial reckoning" brought on by the murder of George Floyd, combined with the pandemic forcing librarians to work from home, brought a sudden attention to "the bias and oppression found within our collections and organization systems" and fueled projects countering harmful past practices. Billey describes the summer of 2020 as a turning point: "We have experienced a shift within the profession" (xi). *Inclusive Cataloging* is about the projects that originated in that summer of upheaval.

But before delving into the case studies, the first third of the book is dedicated to the history and theory of inclusive cataloging. The audience is the cataloger or metadata specialist who is already familiar with the problems of existing library classification systems; problems are described, but the focus is primarily on solutions. Key milestones in the inclusive cataloging movement and special topics such as comics cataloging and accessibility metadata are discussed. Chapters 2, 3, and 4 survey the history of cataloging criticism from the 1930s onward, with all three placing Dorothy Porter Wesley at or very near the start of the timeline. These chapters are somewhat repetitive, covering the accomplishments of Wesley, Brian Deer, and Sandy Berman multiple times. I would have appreciated a longer examination of any of the historical cataloging movements described. The following chapters are more substantial, perhaps because they have the advantage of being about the here and now. Nonetheless, part 1 effectively introduces the major themes at the heart of the case study chapters.

Though few specific figures or statistics are provided, the sheer number and breadth of reparative cataloging projects described support Billey's assertion of a shift within the profession, starting in the mid-2010s and gaining strength in 2020. One of the most significant catalysts is the ongoing conflict over the subject headings "Aliens" and "Illegal aliens." These headings were finally replaced by the Library of Congress (LC) with "Noncitizens" and "Illegal immigration" in 2021, seven years after Dartmouth College students protested the original terms. In the intervening years, "hundreds" of libraries—many inspired by the documentary on the Dartmouth students' activism, *Change the Subject*—made local changes to these headings (54). The impact is visible throughout *Inclusive Cataloging*, with multiple case studies in part 2 citing the "Illegal aliens" heading and LC's inaction as an inspiration for institutional-level reparative cataloging projects. The authors of chapter 5, "Did Libraries Change the Subject?," proposed two American Library Association (ALA) resolutions that would have urged LC to change "Illegal aliens" to "Undocumented immigrants" and asked for increased transparency and staffing at the Policy, Training, and Cooperative Programs Division; neither was passed. Authors Jill E. Baron, Violet B. Fox, and Tina Gross state that the "quiet strategy" undertaken

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by ALA's Public Policy and Advocacy office "likely deserves credit for bringing about the changes the Library of Congress implemented in December 2021," while also asserting that "the problematic and unsatisfactory nature of those changes is also tied to that strategy" (57). Their account complements the case studies on revising the controversial headings, providing an exceptionally detailed description of the highly charged political process that took place behind the scenes.

If the debate over "Illegal aliens" brought wider attention and awareness to offensive vocabulary in classification systems, the events of 2020 infused the situation with a new sense of urgency. More libraries convened working groups to "address problematic content in our catalogs and engage in the reparative work necessary to make our catalogs more inclusive and equitable" (189). To circumvent structural barriers and budgetary constraints, creative strategies were deployed. Librarians at the University of North Carolina at Charlotte tackled "smaller pilot projects focused on tightly defined metadata issues" to make significant gains, including LCSH and FAST remediation in Alma and Primo. Yuji Tosaka at the College of New Jersey identified the topical cutters .N3-5 for "Negroes" as a "small DEI project with a lasting impact" that could be "undertaken on top of existing workloads" when larger projects could not (198). Librarians committed to making change and, in cases where sweeping reform was not feasible, nevertheless pursued the scaled-back change that *was* possible.

Of the nineteen case study chapters, fifteen take place in research libraries. Three chapters focus on projects undertaken at relatively large and well-resourced public libraries. The research library chapters represent a more diverse array of settings within that category, including small individual libraries, research consortia, music libraries, and special collections. Audiences will take different lessons from the case studies depending on their own contexts. The approach taken at the Hayes Research Library at Perkins School for the Blind is necessarily different from that of Cornell University, but both are advancing the work of inclusive cataloging. Not all chapters will be directly applicable to all libraries, but almost any library will find something useful in these chapters. The range of projects and capacities described demonstrates that this work is indeed scalable and possible.

Perhaps the central message conveyed in the pages of *Inclusive Cataloging* is the necessity of iterative improvements to library catalogs in all places, at all times, not as an afterthought, but as a core activity of librarianship. At the close of chapter 2, "This is the Work," Fox and Gross powerfully assert that reparative cataloging "is not secondary or optional. This *is* the work" (24). *Inclusive Cataloging* serves as an all-in-one reference, toolkit, starting point, and inspiration for any cataloger or metadata librarian in search of that work.—*Elizabeth Taft (etaft@bu.edu), Boston University Libraries*