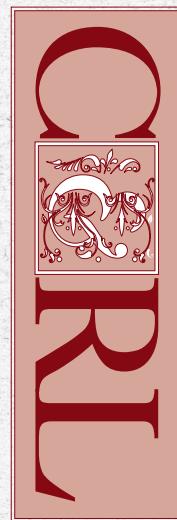


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# COLLEGE & RESEARCH LIBRARIES

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## Guest Editorial

# Is Cultural Humility Too Easy?

Sarah R. Kostelecky, Lori Townsend, and David A. Hurley\*

According to Google Scholar, there have been about 100 publications in the past 12 months about cultural humility and librarianship. Clearly, it is resonating with our profession as a way to make positive change towards equity, inclusion and justice in libraries and librarianship. We ourselves are firm believers that cultural humility can help those who practice it to decenter themselves and their own perspectives in order to better see, and redress, structural inequities and other forms of discrimination both within our libraries and through our services. Having spent the better part of a decade thinking, writing, and presenting on cultural humility, we have heard from many people who are excited about the concept. But we occasionally hear people praising cultural humility while almost simultaneously reinforcing and reproducing the very sort of structural inequities that a practice of cultural humility should aim to redress.

This gives us pause.

On the one hand, fundamentally changing how one sees and understands the world will take time. It shouldn't be surprising that even when someone commits to a meaningful practice of cultural humility, it might take time to see problems they haven't thought to look for. On the other hand, the word *meaningful* is doing a lot of work here. The goal is to dismantle structures of oppression, but those structures will, to borrow the language of nicholae cline and Jorge López-McKnight (2023), attempt to "siphon the energies from any destabilizing effort to its own(ership) institutionalized and professional existence, extracting the transformative elements, neutralizing its demands, and coopting the practice" (2023, p. 178).

How do we resist having the power of cultural humility drained, leaving only empty slogans on a break room poster?

On page 1 of *Cultural Humility*, the ALA Editions Special Report we published last year, we say "each of us needs to understand that our perspective is limited, and work to remain open to other perspectives" (Hurley et al., 2022). *Work* is the key word, and too easily overlooked. We are sometimes guilty of this ourselves, as we try to break cultural humility down into a set of straightforward elements that lower the barrier to entry. But these are intended to serve as prompts, reminders, and signposts, rather than a checklist to complete. We think cultural humility is a threshold practice: understanding comes through doing. The idea of threshold

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practices was first suggested in Gourlay's (2009) work on academic literacies, where "writing is seen not as a 'skill', but as a complex, socially-situated set of meaning-making practices" (2009, p. 182). Cultural humility, too, cannot be reduced to a skill. It too is a "complex, socially-situated set of meaning-making practices." And like other complex practices, it requires ongoing work, work that will transform the practitioner's perspective on both themselves and the world around them. And, if the best way towards that transformation, the best way to develop cultural humility, is to practice cultural humility, starting a practice should be as simple as possible.

But *simple* should not be confused with *easy*. Again, the goal is to dismantle structures of oppression. There is no easy option. There is no quick fix. We must do the substantive work of redressing wrongs. And this can seem like not just hard work, but an impossible ask. Cultural humility gives us an approach to make improvements in the areas we can, without burning out even when change seems to come too slowly.

Cultural humility may seem easy in the abstract, but a meaningful practice requires time, attention, and doing the hard work.

## Cultural Humility across Librarianship

For examples of cultural humility in action within librarianship, we found recent publications from our academic library colleagues instructive. Darren Ilett (2023) discusses his own learning journey as an information literacy instructor who has incorporated cultural humility practice as a way to center his teaching on his students and shift focus away from himself as an instructor. He shares how he recognized that his own assumptions about his students were serving as a barrier to his goal of engaging with and supporting their learning, which he discovered through self-reflection on his student interactions. In working to identify and correct power imbalances within his classroom, Ilett now uses activities to let students be co-creators of their shared classroom environment. One strategy he developed for his credit course is a March-Madness style topic selection process where students submit and vote on the theme that will guide them all throughout the semester.

Jessica Tai (2021) argues for the use of cultural humility in archival practice, specifically as a framework for the process of redescription. She notes the importance of self-reflection on existing practices as an individual but also at the organizational level. Centering the community in a redescription process recognizes the archivist's is not the only expertise and acknowledges standard practice and norms of the profession are not the norm for all. Tai emphasizes the importance of ongoing communication with the communities of creation as part of the practice of lifelong learning, another tenet of cultural humility. She believes the framework "encourages a wider culture of transparency and self-assessment, with the continual goal to recognize and challenge power imbalances" (Tai, 2021, p. 19).

Melanie Bopp, Tricia Mackenzie, and Kimberley A. Edwards (2023) argue that any department in a library can use a cultural humility framework, including Metadata and Access Services. They discuss the seemingly small changes they made to their policies and practices which led to larger shifts in making the library culture more patron focused. In Access Services, the manager empowered employees to have the discretion to make policy exceptions and supported their decisions, allowing the library to meet user needs in ways they were not able to previously due to the strict adherence to policies. In Metadata services, they used elements of cultural humility to identify problematic cutter numbers which they took the time to

change. They also worked with their consortial library partners to display a preferred subject heading across libraries. While the problematic LoC subject heading is unfortunately still on the item records, the library acted to improve the catalog records, recognizing the problem but also that change can take time.

## **Elements of Practice**

By our definition, cultural humility “involves the ability to maintain an interpersonal stance that is other oriented in relation to aspects of cultural identity that are most important to the other person, the ability to recognize the context in which interactions occur, and a commitment to redress power imbalances and other structural issues to benefit all parties” (Hurley et al., 2019). We unpack that definition at length elsewhere, but we have also found it helpful to identify some of the elements of practice that can help turn the definition into action. We purposefully keep them simple to serve as guides for approaching the work of transformative change. And, yes, to hang on our walls as a poster we can look to when we need inspiration.

Each element, while described separately for clarity, does not exist in isolation. These elements are interconnected, often overlapping, and mutually reinforcing. They form an integrated practice where each aspect informs and enhances the others, creating a holistic approach to cultural humility. It’s important to understand them not as distinct behaviors but as facets of a comprehensive and interrelated practice.

### ***Be Open***

Being open to understanding new ideas and recognizing different perspectives reinforces that our norms are not universal. This necessitates a flexibility in our understanding of the world, that our foundational knowledge may have to be revisited, reconsidered, and expanded. By listening to and appreciating the experiences of others, we become more accepting in realizing our current understandings are wrong—and work to learn new ones. By looking at our organizations and being willing to review long-standing policies and practices, we may find unexamined labels and frameworks that are obstacles to our goals.

As library workers, we are well situated for this learning because we’re surrounded by materials that share stories and experiences that are different from our own. We can also find joy in learning about the many ways people experience the world, and celebrating the many cultures that make our existence richer.

### ***Defuse Your Defensiveness***

Defensiveness can corrupt all other aspects of the work. In the moment, during a fraught personal interaction for example, defensiveness makes mindful listening impossible, and makes oneself the center of the interaction. A deep breath can give space to defuse this sort of defensiveness, and allow one to reengage with the conversation. But there is another kind of defensiveness as well. One that manifests as anger or dismissiveness towards an idea or perspective. This kind of defensiveness, which can happen when you are engaging with an idea on your own, presents an opportunity to examine your thoughts and assumptions. Why are you having a strong negative reaction to this idea? Why does someone else find it compelling? This is especially worthy of reflection if you respect the person or people who are advancing the idea that your defensiveness wants to dismiss out of hand.

The goal isn't to convince yourself that the idea is right or worthwhile, but to shift your understanding enough so that instead of thinking something along the lines of "that's the stupidest thing I've ever heard" you can think, at a minimum, "ok, I get where they are coming from." Using defensiveness as a prompt for self-reflection is an invaluable way to begin practicing seeing from multiple perspectives.

A note of caution: as you defuse your defensiveness, you may feel guilt or shame for not having seen as problematic inequities that you may have been contributing to or benefiting from. This is true for everyone, but perhaps especially for white Americans dealing with issues related to race. Defuse these as well. The realizations are important, but castigating oneself is a cul-de-sac rather than the road to change.

### ***Decenter Yourself***

Decentering does not mean devaluing: you (yes you!) are unique and valuable. Through the act of decentering, we allow ourselves to recognize and appreciate the unique and valuable person with whom we are interacting. Placing someone else at the center of our attention can help us transcend our own cultural norms, for a time.

In an editorial discussing epistemological decentering in the field of engineering education research, Secules (2023) argues for the "importance of not knowing" as a researcher (2023, p. 259). Rather than ignorance, not knowing is an ongoing awareness of the knowing possessed by others and the limits of our own perspective. He also cautions against knowing too quickly, which he terms "incautious knowing," before we've had a chance to listen and process (Secules, 2023, p. 261). As a white researcher, he addresses white researchers directly, but this approach can work for all of us.

For librarians, a cultivated ability to listen actively and shift our focus away from ourselves allows us to provide better service to our community and be better partners for those working with us.

### ***Listen Mindfully***

We are in a profession that is focused on finding, or knowing, all the answers. This can manifest as a kind of superficial listening and reliance on quick assessments as we concentrate on our own goal of efficiently helping the person in front of us. When interacting with someone using a cultural humility approach, the goal is to be other oriented rather than focusing on ourselves. We can do this by using active listening skills, which encourage us to thoroughly listen and leave our own emotions, preconceptions, and reactions aside. This means fully focusing in the moment, rather than distractedly listening while simultaneously planning our response.

When we listen mindfully, it also reinforces a tenet of cultural humility: we cannot know everything and shouldn't expect to. If we assume we know the other person's needs before they tell us, we can miss what they are actually trying to communicate.

### ***See Perspectives Beyond Your Own***

Many of the elements of practice we identify serve to help strengthen the ability to recognize other perspectives. The observation that what you think of as normal isn't objectively normal can either seem obvious to the point of being banal, or it can seem counterintuitive and nonsensical. We think this is a threshold concept (Meyer & Land, 2003), one which people initially find troublesome, but that completely transforms one's understanding once it is

grasped. Unfortunately, threshold concepts are also among the most difficult to learn. Using one's defensiveness as a prompt, as discussed above, is one way to engage with this concept.

A second way is to recognize the perspectives that are embedded in our policies, services, buildings, and so on. Identifying and naming the values and assumptions that are implicit in our libraries is good practice for seeing how people with other perspectives might perceive them.

Seeing other perspectives does not only increase our ability to see problems that don't impact us directly, it expands our understanding and appreciation of the world in profound and often beautiful ways.

### ***Practice Critical Self-Reflection***

Critical self-reflection is a cornerstone of cultural humility. By encouraging introspection and self-awareness, it helps us acknowledge our own biases, beliefs, cultural identities, as well as our situational power. It also helps us understand how these factors influence our interactions with others. Perhaps surprisingly, this self-reflection helps us decenter ourselves. It pushes us to reassess preconceived notions and prejudices, and be open to viewpoints that challenge our own. An ongoing commitment to critical self-reflection is necessary for the continuous growth and evolution of a cultural humility practice.

### ***Recognize Power Dynamics***

The role of relative power in a situation, even when the power differences are straightforward, can complicate interactions in ways that might not be readily apparent. In professions like healthcare, it is understood that if these power differentials are not appropriately managed, they can result in less positive outcomes. The same is true in libraries, with the added complexity that the power relationships are less straightforward than between doctor and patient. For all of us, the limits of our power are more salient than the power we do exert, potentially further obscuring its influence in our interactions. A practice of cultural humility promotes an awareness of the potential influence of power within interactions, and a commitment to redress any negative consequences of power imbalances.

### ***Embrace Hope***

In order to make positive change, we must believe that change is possible. Central to this belief is the cultivation of hope—allowing ourselves to envision and believe in a better future. As Freire writes, “whenever the future is considered as a pre-given … there is no room for utopia, nor therefore for the dream, the option, the decision, or expectancy in the struggle, which is the only way hope exists” (2014, p. 82). Hope may sometimes elude us because of the size of existing challenges and the reality of past disappointments. Maintaining hope means resisting the allure of cynicism, low expectations, and inaction. Embracing hope means a celebration of small wins, a sincere appreciation for the collaborative efforts of allies, and a commitment to the ongoing pursuit of change.

### ***Be Ok with Making Mistakes***

Mistakes are expected. A preoccupation with avoiding mistakes hinders a practice of cultural humility. We should, of course, endeavor not to hurt or offend others—learning about people, communities, and their contexts. However, if we are to make meaningful change, we must be will-

ing to experiment and try new things. In the process, we will inevitably make mistakes: obvious mistakes, stupid mistakes, funny mistakes, well-meant mistakes, awful mistakes, embarrassing mistakes. These mistakes present us with opportunities for learning and growth, including in our cultural humility practice. Over time, we will learn to recover more quickly and effectively—correct the mistake, make amends, forgive ourselves—and keep going. Continued effort and a willingness to risk mistakes builds trust and is essential to a practice of cultural humility.

### ***Take Action to Make Things Better***

Cultural humility is more than a mindset or worldview. Fundamentally, it is a praxis—an approach to making positive change as we move through the world. If existing conditions are causing harm and perpetuating inequities, cultural humility requires us to summon our courage and take action to challenge the status quo. Although self-reflection and shifts in mindset can facilitate this work, the crux of cultural humility lies in tangible actions, both modest and extraordinary. Through taking purposeful action, we hold ourselves and the organizations we work in accountable.

### ***Welcome Positive Transformation***

Embracing change can be a challenge because change can be scary and difficult, especially if it affects long held beliefs and practices of individuals or an organization. Yet, resisting change as a way to avoid any negative outcomes can also be a missed opportunity to experience positive change. If we can accept the idea of not knowing, this can help us be open to and engage with positive shifts in life. We cannot know the future nor the impact of changes in policies and practices, but, if we are willing to try something new and listen to those who advocate for change, there is an opportunity to improve things for everyone.

### **Conclusion**

The elements of practice outlined above may seem deceptively simple—too easy for the task at hand. But if they are taken on with honesty and effort, they will reveal things that challenge our current understanding of ourselves and our organizations.

We, the authors, hope to see cultural humility practiced in libraries of all types, across functions and roles, focused both externally and internally. Such efforts, especially if shared through publication and presentation, will help deepen our understanding of cultural humility as a useful approach for making substantive change in the profession, and inspire us to action.

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# Hidden Barriers: The Experience of Academic Librarians and Archivists with Invisible Illnesses and/or Disabilities

Katelyn Quirin Manwiller, Amelia Anderson, Heather Crozier, and Samantha Peter

This study documents the experience of, and identifies professional barriers for, academic librarians and archivists with invisible illnesses and/or disabilities. Results from a survey of MLIS-holding individuals in academic positions indicate that invisible illness or disability often impacts the ability to succeed at work, but many are reluctant to disclose or request accommodations to alleviate those disparities. Respondents reported barriers including professional repercussions for disclosure, difficulty during the hiring process, stigma from supervisors and colleagues after requesting accommodations, and an overall lack of understanding about invisible illness and disability in the profession.

## Introduction

The library profession, and in particular academic librarianship, has sought to make the field more inclusive and diverse for much of the last twenty years. Despite this commitment, there has been little done to make academic librarianship more accessible to workers with disabilities. In the Association of College and Research Libraries' 2012 Diversity Standards: Cultural Competency for Academic Libraries, the group refers to librarians with disabilities only once: "Diversity is one of ALA's five key action areas to ensure high-quality library services to all constituents. Within that mission is the need to recruit underrepresented groups and individuals with disabilities to the profession."<sup>1</sup> This statement is also the only mention of disability on ACRL's Equity, Diversity, and Inclusion LibGuide outside of a few linked articles. Furthermore, the only division of the American Library Association to have a statement about library workers with disabilities has been disbanded.<sup>2</sup> Despite ALA and ACRL's commitment to diversity, equity, and inclusion, they provide no structured support for librarians belonging to one of the largest marginalized identities in the country.<sup>3</sup> These shortfalls of our professional organizations

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have left library workers with chronic illnesses and disabilities few resources to help navigate the inaccessibility of the field, and minimal professional discourse about their experiences.

In ALA's 2017 demographic study of about 38,000 members, 2.91 percent of respondents answered yes to the question, "Do you have a disability?" This is up from 2.8 percent in the 2014 study.<sup>4</sup> However, the demographic data from ALA may not match the actual lived experience of library workers with physical or psychological impairments or chronic illnesses that qualify as a disability under the Americans with Disabilities Act (ADA). For example, in a survey of more than 500 academic librarians with mental illness, only 8 percent of respondents considered their mental illness a disability.<sup>5</sup> This gap in self-identification could cause ALA's demographic information to miss library workers living with illnesses that impact their daily life. In addition, the ALA study only includes members and therefore does not encompass the entire profession. Beyond this data, research about the experience of librarians with disabilities has only emerged within the last five years in LIS literature. Common barriers for disabled librarians are beginning to be documented as we develop a basic understanding of the inaccessibility of academic librarianship. In order to fully address these barriers, we must investigate the unique experiences of librarians with different types of disabilities, including those considered "invisible."

Throughout this article and the study it describes, we use "invisible" (in reference to illness and/or disability) as an adapted definition from the Invisible Disabilities Association: "An invisible disability is a physical, mental or neurological condition that is not visible from the outside, yet can limit or challenge a person's movement, senses, or activities."<sup>6</sup> Though it was the term used most frequently in the initial literature review and this study's development, using invisible versus visible may be problematic for people with disabilities. Margaret Price et al. found that the invisibility metaphor places an additional burden on the person with disabilities by implying it is their responsibility to make themselves visible.<sup>7</sup> Alternatively, the term non-apparent places responsibility on others to recognize an individual's disability. Like most identifying terminology, the preference of the individual person should be paramount when discussing disability. We suggest non-apparent or not-readily-apparent as alternatives to invisible. This article will use invisible, non-apparent, and/or hidden to signify that a person's illness or disability cannot be easily identified by other people.

This research study intends to capture the experiences of academic librarians, including archivists, living with invisible or non-apparent illnesses and/or disabilities.

The study has two primary objectives:

1. To identify barriers facing individuals with invisible illness and disability who are degreed LIS professionals working in academic libraries
2. To determine ways academic libraries and the LIS profession can be more inclusive and accessible to those with invisible illness and disability

## **Literature Review**

### ***Invisible Illness and Disability***

To understand disability within LIS framing, we recommend Alana Kumbier and Julia Starkey's definition of disability as an "inherently relational, social matter; it is something that happens, over and over, in interactions among people." It is an experience that is "shaped by social, cultural, historic, political, and economic factors...[that] impact people's lived experience of impairment."<sup>8</sup> Unfortunately, most discussion of disability within LIS has been far

more limited than Kumbier and Starkey's comprehensive definition of lived experience. The majority of LIS literature focuses on patron access through building compliance to the ADA and website accessibility.<sup>9</sup> This narrow perception creates an insufficient understanding of disability in librarianship, as being disabled is a far more diverse experience than using a mobility aid or experiencing vision loss. It extends to many impairments that are not visibly apparent to others, including but not limited to physical illness, mental illness, and learning and developmental disabilities.

Having a non-apparent illness or disability presents unique challenges for academic library workers. As detailed by N. Anne Davis, "When individuals are not 'seen' as disabled, it can be more difficult for them to secure the assistance or accommodation they need to function effectively. Because they are not identified as disabled, those whose disabilities are invisible must often bear the burden of securing the assistance they require."<sup>10</sup> Librarians with invisible illnesses and/or disabilities must navigate the deeply personal experience of deciding when, how, and to whom to disclose their conditions. Invisibly disabled workers often choose not to disclose for fear of not being believed or experiencing repercussions from supervisors and coworkers.<sup>11</sup> This is especially true for individuals with commonly stigmatized conditions, such as mental illness or chronic pain, and for those who do not personally identify as disabled.<sup>12</sup> In addition, when disability intersects with other marginalized identities, disclosure is even more fraught. A person of color, for example, who may already experience racism in the workplace, would need to weigh the additional ableist discrimination that could accompany disclosure.<sup>13</sup> In a field with well-documented racial disparities in our workforce, academic librarians of color could be at particular risk for repercussions when navigating disclosure. However, disclosure in some form is required to receive accommodations under the Americans with Disabilities Act.<sup>14</sup> Workers who do not feel safe disclosing or going through the accommodations process therefore have little recourse to adjust their work environment. This barrier could lead to decreased workplace performance or worsened health conditions over time.<sup>15</sup>

When evaluating academic librarianship for equity and inclusion, we must consider how concerns regarding disclosure, workplace culture, and accommodations found in the larger workplace research are present for librarians with non-apparent illnesses or disabilities. Unfortunately, the unique accessibility concerns for invisibly disabled library workers have not been extensively examined by the profession.

### ***Disability in LIS Literature***

The majority of library literature on disability focuses on serving patrons with disabilities and ensuring that library buildings are accessible. In a content analysis of disability and accessibility in LIS literature, Heather Hill found that of the 198 articles examined, only 35 percent were research articles, and that much of the literature focused on presenting problems and recommending solutions. Thirty-six percent of those research articles included people with disabilities in information seeking or accessibility testing roles. None had authors that self-identified as disabled, and no theme emerged about library workers with disabilities.<sup>16</sup> Similarly, Kumbier and Starkey found that most LIS literature and documentation on access, including diversity initiatives, use a "tick-box" framework to treat access or disability issues as individual problems to be solved instead of systemic inequalities that prevent librarianship from realizing our professional values of access and equity.<sup>17</sup> Finally, in a quasi-systematic review published after this study ended, Amelia Gibson, Kristen Bowen, and Dana Hanson

found 820 pieces of LIS literature on disability published between 1978 and 2018, and studied a sample size of 282 articles. From that sample, they found that the majority (80.7%) of the original research studies focused on technology and 79 percent of the sample discussed disability as primarily a physical characteristic or using the medical model.<sup>18</sup> Few articles in their study recognized disability as a social construct or the intersectionality of disability and other marginalized identities. Like the two reviews discussed above, this one concluded that the literature “suggests an unprioritized and short-sighted understanding of disability and much work to do.”<sup>19</sup>

For this study, we reviewed the limited number of articles written about the experience of library workers with a disability, including some that examine the unique experience of library workers with invisible illnesses and/or disabilities. These articles represent an emerging field within LIS literature. The two earliest articles were from outside of North America and discuss disability in academic libraries through Australian and Irish law, respectively.<sup>20</sup> The articles from North America were published starting in 2013; they are a combination of research articles, reflections on the field, and personal experience. In an ACRL Conference Session, Kiyomi Deards discusses what appears to be the first survey about the workplace experiences of academic librarians with health conditions. Deards used twenty-five open-ended questions primarily regarding health and workplace issues but received a small sample size of only seventeen responses. The survey was not complete at the time of the conference presentation, and there do not appear to be additional publications about it.<sup>21</sup>

The first identified research articles about disabled library workers did not appear until 2018. Joanne Oud conducted a survey of academic librarians in Canada to measure job satisfaction and perceptions of librarians with disabilities. Of the 268 respondents, 14 percent self-identified as having a disability, and 72 percent of those individuals reported having an invisible disability. In a few disability-specific survey questions, respondents noted an overall distrust in the accommodations process; 68 percent said they had not requested any, fear of the impact on their jobs being the primary reason. Overall, the librarians with disabilities reported similar levels of job satisfaction as other respondents, but they did score their institutions lower on diversity and accessibility than non-disabled respondents. Significantly, respondents who reported they were managers had a higher satisfaction with the diversity and accessibility in their institutions than respondents who were not managers. Since very few of the librarians with disabilities also reported being managers, this suggests a disconnect between manager perceptions about accessibility in the workplace and that of library workers with disabilities.<sup>22</sup> Oud interviewed ten of the respondents with disabilities to gather more information about their experiences in the workplace and explored that qualitative work in a later article. Nine of the ten interviewees reported invisible disabilities and major barriers corresponding to a lack of understanding about disability within the profession, the most common of which were adjusting to colleague and supervisor discomfort, reluctance to disclose or discuss the disability, and reluctance to request ADA accommodation.<sup>23</sup> Most respondents indicated that more open discussion and awareness about the diversity of disability in the workplace would improve their work environments.<sup>24</sup> In addition to Oud’s work, Robin Brown and Scott Scheidlower published the results of a quantitative and qualitative study of librarians with disabilities. Around fifty people self-identifying as disabled completed a survey, and the authors interviewed a portion of the respondents. They included responses from librarians with a variety of disabilities on topics such as identity, work ethic, and com-

munity. Notably, roughly 38 percent of respondents reported “challenges” that were invisible and 64 percent had requested accommodations.<sup>25</sup> In another survey, Erin Burns and Kristin Green focused specifically on the stigma librarians with mental illness face in the profession, adapting Michael King et al.’s forty-five question survey measuring mental health stigma to be librarianship-specific.<sup>26</sup> They had over 500 respondents and found that potential stigma was a large barrier to disclosing their mental illness in the workplace. Significantly, only 8 percent of respondents considered their mental illness a disability.<sup>27</sup> The most recent study of librarians with disabilities is Kelsey George’s book chapter, published after our survey was completed. In a survey of ninety-nine self-identifying library workers with disability and/or chronic illness, George found that most (82%) reported disclosing their disability or illness in some way in the workplace, and fifty-six of the respondents reported experiencing ableist microaggressions from colleagues or patrons.<sup>28</sup>

Reflections on the profession and personal experiences appear in the LIS literature starting with Jessica Schomberg’s 2018 book chapter that explores Critical Disabilities Studies and its implications for improving inclusion of workers with disabilities in libraries.<sup>29</sup> Schomberg, along with Wendy Highby, later published a book titled *Beyond Accommodation: Creating an Inclusive Workplace for Disabled Librarians*. This book combines theory with the authors’ experiences and that of interviewees to explain the current state of disability inclusion in librarianship and present ways to improve the accessibility of the field.<sup>30</sup> Experience and theory is also blended in a 2019 *Library Trends* issue on disability; Teneka Williams and Asha Haggod reflected on the state of disability in diversity work, JJ Pionke detailed the barriers he faced when requesting accommodations, Gina Schlesselman-Tarango explores her experience with infertility and its accompanying grief, and Christine Moeller examines how precarity and ableism in academia harms librarians with disabilities.<sup>31</sup> In one of the few writings specifically on invisible disability and librarianship, Samantha Cook and Kristina Clement explain the unique challenges faced by people with invisible disabilities in the workplace and how libraries can best support them.<sup>32</sup>

Lastly, two columns specifically addressed barriers to the hiring process for librarians with disabilities. Anne Ford wrote about barriers during the hiring process for people of color, LGBTQIA librarians, and librarians with invisible disabilities in American Libraries. The section on invisible disabilities included interviews with two librarians self-identifying as disabled, both of whom expressed concern about disclosure of their disability during the job search process.<sup>33</sup> Elizabeth Leonard provided a brief literature review on the barriers to hiring people with disabilities and improving diversity in librarianship. This column concludes with recommendations for employers looking to create more inclusive hiring practices.<sup>34</sup>

Overall, it appears that librarianship as a profession is only starting to grasp the impact of disability on the experience of library workers. The current literature on academic librarians and archivists living with disability or illness presents a number of barriers to equitable access to work, including stigma from colleagues, fear of disclosure, and the inaccessibility of the accommodations process. This echoes the larger body of literature on invisible disability in academia, which heavily focuses on the complexity and personal nature of the decision to disclose and request accommodations. The accommodations process itself is also noted in many studies as being difficult to navigate, due to a lack of clear policies for faculty. Most authors conclude that academia needs to shift to providing readily accessible accommodations and that doing so will benefit all workers.<sup>35</sup>

## Methods

Across both academic and LIS literature, there is clear indication that the field lacks an inclusive and accessible environment for disabled workers. By better understanding how these barriers impact academic library workers specifically, we can move closer to an equitable profession. To build that understanding, we posed three research questions to be answered through a study of academic librarians and archivists living with non-apparent illnesses and/or disabilities:

1. How does living with an invisible illness or disability impact the ability of full-time, degreeed LIS professionals in academic libraries and archives to do their work?
2. How do degreeed academic LIS professionals handle disclosure of their invisible illness or disability?
3. How do degreeed academic LIS professionals face barriers/stigma in the workplace for their invisible illness or disability?

Mixed-methods approaches were used to determine themes and correlations within data. This study implemented a survey with both open-ended and closed questions to address research questions. Quantitative data was collected and analyzed to better understand objective numerical results, while qualitative data was collected and analyzed to provide rich, descriptive responses in which participants could elaborate on their experiences.

## Respondents

The population for this study comprised academic librarians and archivists with invisible illnesses or hidden disabilities. Respondents self-identified as both being a librarian with a masters degree in library science/studies (MLS, MLIS, MSIS, etc.) and as having an invisible illness or hidden disability. We provided respondents with definitions to ensure consistency and clarity in identification. We adapted and cited definitions of disability, chronic illness, invisible, and accommodations (see appendix A). We differentiated between disability and chronic illness, as not everyone who lives with a chronic illness identifies as being disabled. Sampling frames were selected based on relevant groups and calls for participation sent to ALA and SAA LISTSERVs, including ACRL Universal Accessibility Access Group, ACRL Community and Junior College Libraries (CJCL), ACRL College Libraries Section (CLS), ACRL University Libraries Section (ULS), and SAA's Accessibility and Disability Section. The survey was also shared through snowball sampling on our social media accounts.

## Data Collection

The survey instrument was designed specifically for this research. Questions, phrasing, and terminology were based on extensive consultation of the literature on invisible disability in the workplace as well as our lived experiences as academic librarians with invisible illnesses. The survey was input into Qualtrics and distributed over a four-week period from April 15 to May 15, 2020.

The thirty-question survey employed three sections designed to capture different information in an accessible format (see appendix A). Part 1 was a short demographic section of multiple choice questions to collect background information of respondents. It also included qualifying questions about living with an invisible illness or disability. Part 2 consisted primarily of multiple choice questions about respondents' time in librarianship, including disclosure of illness and/or disability to address the second research question and accommodation requests to address the third research question. Participants could elaborate on answers through

two open-ended questions related to describing disclosure and discussing accommodations. Lastly, part 3 used Likert scale questions to examine specific aspects of the academic library workplace to determine potential barriers to the profession. Part 3 was further divided into four subsections: "Hiring Process," "Daily Work Experience," "Professional Development," and "Accommodations." The combination of these subsections provided data for all three research questions.

The survey format was chosen specifically to ensure the survey was minimally taxing for respondents. Individuals who live with invisible disabilities may have limited energy reserves and be unable to respond to lengthy, open-ended questions. We separated part 2 and part 3 to provide consistency in question format and created subsections in part 3 so as not to overwhelm the respondents.

### ***Data Analysis***

To make sense of qualitative data, four members of the research team coded responses to open-ended questions independently. Rather than using a pre-established codebook, we allowed for codes to emerge organically. These codes were compared to ensure agreement among members of the research team. This triangulation process added to the study's validity. Then, twenty-three agreed-upon codes were collapsed into larger themes that represented broad findings. Representative quotes were presented "in vivo," allowing respondents' words to speak for themselves. Quantitative data was largely analyzed through descriptive statistics.

### ***Ethical Considerations***

Prior to data collection, IRB approval was obtained through the researchers' four individual institutions, with one serving as the overseeing board. The Qualtrics survey opened with an explanation of the study, followed by a consent statement which provided potential respondents with information about the voluntary nature of the study, as well as measures to ensure confidentiality. Additionally, the study opened with definitions related to invisible disability, which allowed for respondents to clearly understand the language and terms used throughout the survey (see appendix A). No participant names were collected. Respondents could elect to provide email addresses if interested in follow-up interviews; this data was collected in a separate, linked survey that did not connect identifying information with survey responses.

### ***Findings***

The findings for this study are presented primarily in the order the questions appeared in the survey. Questions about accommodations, however, were consolidated into one section to best demonstrate respondent experience. A full dataset is linked in appendix B.

### ***Demographics***

The number of responses varied based on the experiences of respondents, but the overall number of responses rate was 359. Fifty-nine respondents were disqualified due to either not working in an academic library or not identifying as having an invisible disability, leaving our primary sample size to be 300. The only required questions were the initial qualifying questions; the remainder of the questions were optional, and respondents could choose to respond or skip different questions based on their experiences.

In part 2, respondents were asked a series of questions related to age, gender, and race/ethnicity, and basic questions pertaining to their employment. The majority of respondents (29%) were ages 29–35, 27.6 percent were 35–45, 16.2 percent were 45–55, and 12.8 percent were 55 and older. White respondents made up 79.5 percent of the total, while 3.3 percent were Black/African American and Hispanic/Latinx, 0.3 percent were Native American and Pacific Islander, 1.1 percent were Asian, and 3.1 percent identified as other.

When asked if they had a chronic illness, 65 percent of respondents selected yes, with 67.1 percent identifying the chronic illness as invisible. When asked if they had one or more disabilities, only 50.7 percent of respondents selected yes, with 57.7 percent identifying their disability as invisible.

In part 2, respondents were then asked two questions about work history. Among the respondents, 24 percent have been working in the LIS profession for five to ten years, 18.4 percent for ten to fifteen years, 16.4 percent for twenty-plus years, 15.9 percent for less than five years, and 9.5 percent for fifteen to twenty years. When asked how long they have been in their current position, 24.8 percent have been working for less than two years, 24.5 percent for two to five years, 18.9 percent for five to ten years, 8.5 percent for ten to fifteen, 4.5 percent for fifteen to twenty years, and 3.3 percent for twenty-plus years.

### *Disclosure*

In part 2, respondents were asked a series of questions about disclosing their illness and/or disability in the workplace. First, they were asked who they have disclosed their illness or disability to at work. Then, using conditional logic, they were asked when they chose to disclose in each situation. They were given a set of answers to choose from in a check-all-that-apply format, with “other” as an option in every case. Tables 1–8 represent the results from these questions. “Colleagues I consider close friends” was the most frequently selected option for the first question (24.33%), with the majority of responses to its follow-up question being “As I built a personal relationship with colleagues” (51.34%). “When my illness/disability impacted my work” was the most frequently selected answer to the follow-up question for colleagues they work with regularly (36.78%), direct supervisor (38.42%), other library administration (29.41%), library director (31.43%), and open to everyone (26.83%). Lastly, requesting accom-

**TABLE 1**  
**Whom have you disclosed your illness and/or disability to at work?**

Field	Count	Percentage
Colleagues I consider close friends	154	24.33%
My direct supervisor (if not library director)	125	19.75%
Colleagues I work with regularly	113	17.85%
Library director	53	8.37%
I am open about my disability/illness with everyone	53	8.37%
Human resources/disability office	50	7.9%
No one	41	6.48%
Other library/administrator that I do not report to directly	21	3.32%
Other	23	3.63%
Total	633	

**TABLE 2**  
**When did you disclose to colleagues you consider close friends?**

Field	Count	Percentage
As I built a personal relationship with colleagues	115	51.34%
When my illness/disability impacted my work	57	25.45%
Upon receiving a diagnosis or beginning treatment	22	9.8%
Once I began working	14	6.25%
When requesting accommodations	10	4.46%
Other	6	2.68%
During the interview/hiring process	0	0%
Total	224	

**TABLE 3**  
**When did you disclose to colleagues you work with regularly?**

Field	Count	Percentage
When my illness/disability impacted my work	64	36.78%
As I built a personal relationship with colleagues	53	30.46%
Upon receiving a diagnosis or beginning treatment	21	12.07%
Once I began working	18	10.34%
When requesting accommodations	12	6.9%
During the interview/hiring process	3	1.72%
Other	3	1.72%
Total	174	

**TABLE 4**  
**When did you choose to disclose to your direct supervisor (if not the library director)?**

Field	Count	Percentage
When my illness/disability impacted my work	68	38.42%
When requesting accommodations	27	15.25%
As I built a personal relationship with colleagues	25	14.12%
Upon receiving a diagnosis or beginning treatment	24	13.56%
Once I began working	22	12.43%
During the interview/hiring process	7	3.95%
Other	4	2.26%
Total	177	

**TABLE 5**  
**When did you choose to disclose to other library administrators/managers that you do not report to directly?**

Field	Count	Percentage
When my illness/disability impacted my work	10	29.41%
As I built a personal relationship with colleagues	6	17.65%
Upon receiving a diagnosis or beginning treatment	5	14.71%
Once I began working	3	8.82%

**TABLE 5**

**When did you choose to disclose to other library administrators/managers that you do not report to directly?**

Field	Count	Percentage
When requesting accommodations	5	14.71%
During the interview/hiring process	1	2.94%
Other	4	11.76%
Total	34	

**TABLE 6**

**When did you disclose to the Library Director?**

Field	Count	Percentage
When my illness/disability impacted my work	22	31.43%
As I built a personal relationship with colleagues	11	15.71%
Upon receiving a diagnosis or beginning treatment	12	17.14%
Once I began working	9	12.86%
When requesting accommodations	8	11.43%
During the interview/hiring process	4	5.71%
Other	4	5.71%
Total	70	

**TABLE 7**

**When did you disclose to the Human Resources/Disability office?**

Field	Count	Percentage
When requesting accommodations	25	36.23%
When my illness/disability impacted my work	19	27.54%
Upon receiving a diagnosis or beginning treatment	9	13.04%
During the interview/hiring process	6	8.70%
Once I began working	4	5.80%
As I built a personal relationship with colleagues	3	4.35%
Other	3	4.35%
Total	69	

**TABLE 8**

**If you are open about your disability/illness with everyone, when did you disclose?**

Field	Count	Percentage
When my illness/disability impacted my work	22	26.83%
As I built a personal relationship with colleagues	21	25.61%
Once I began working	15	18.29%
Upon receiving a diagnosis or beginning treatment	10	12.20%
When requesting accommodations	9	10.98%
During the interview/hiring process	3	3.66%
Other	2	2.44%
Total	70	

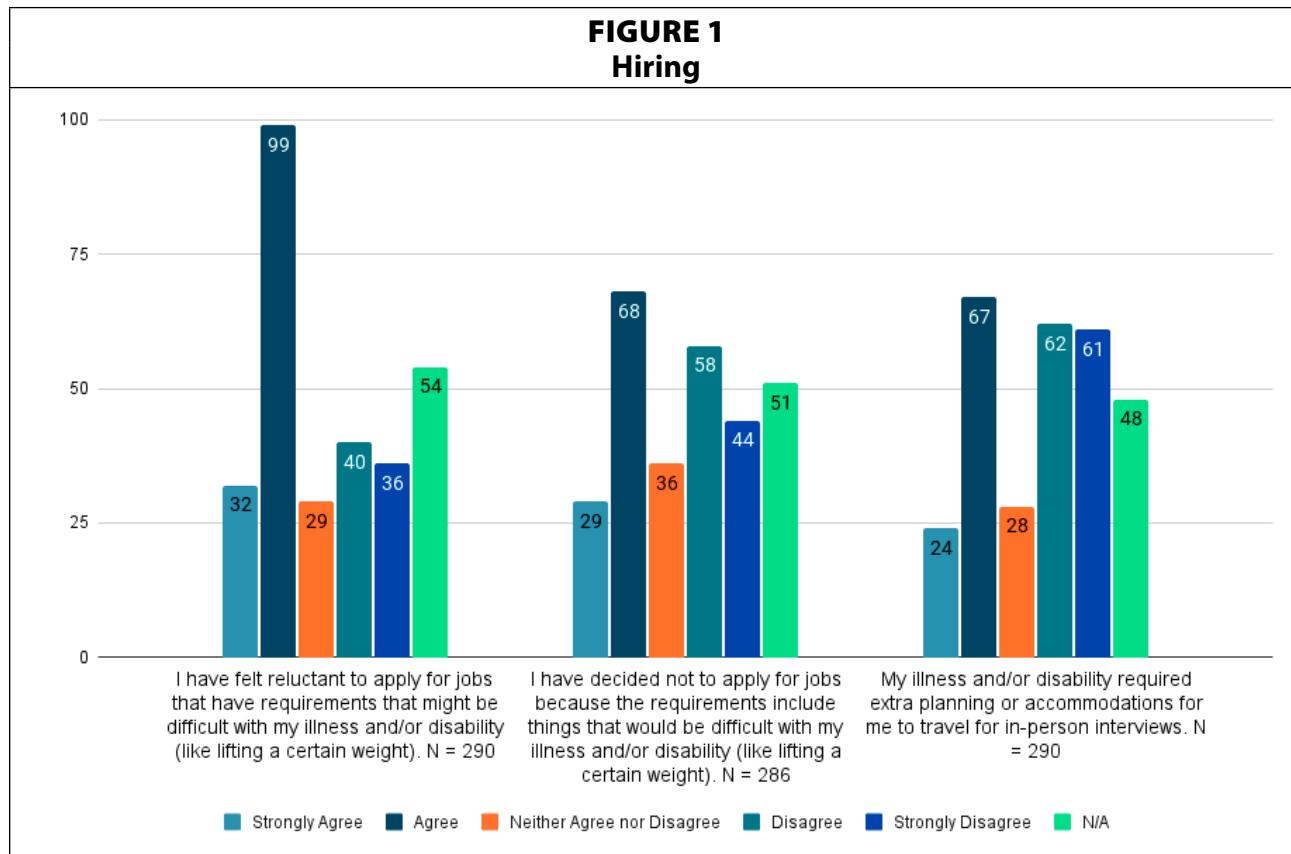
modations was the most frequently selected option when disclosing to human resources or a disability office (36.23%).

There were a variety of answers within the “other” section of these questions. One theme presented in the open responses was disclosing when it came up in conversations, such as, “I’m open about it, but only if it comes up” and “After colleagues disclosed their own struggles/initial pursuit of therapy to me.” Another theme was disclosing in relation to tenure, with examples such as “After Tenure and well after 20-plus years” and “When my tenure was threatened based on issues related to my illness and disability.” Like the last example, some respondents noted feeling forced to disclose due to discrimination, including “When I felt discriminated against & my supervisor was not providing required accomodations [sic].” Finally, a number of respondents discussed selectively disclosing depending on the situation or the type of illness or disability experienced: “I disclose my multiple disabilities differently to different groups”; “I am open about my physical illnesses and disability but I do not disclose my mental illness to anyone except very close colleagues”; and “I am open about my disability (hearing loss) but not about my chronic illnesses.”

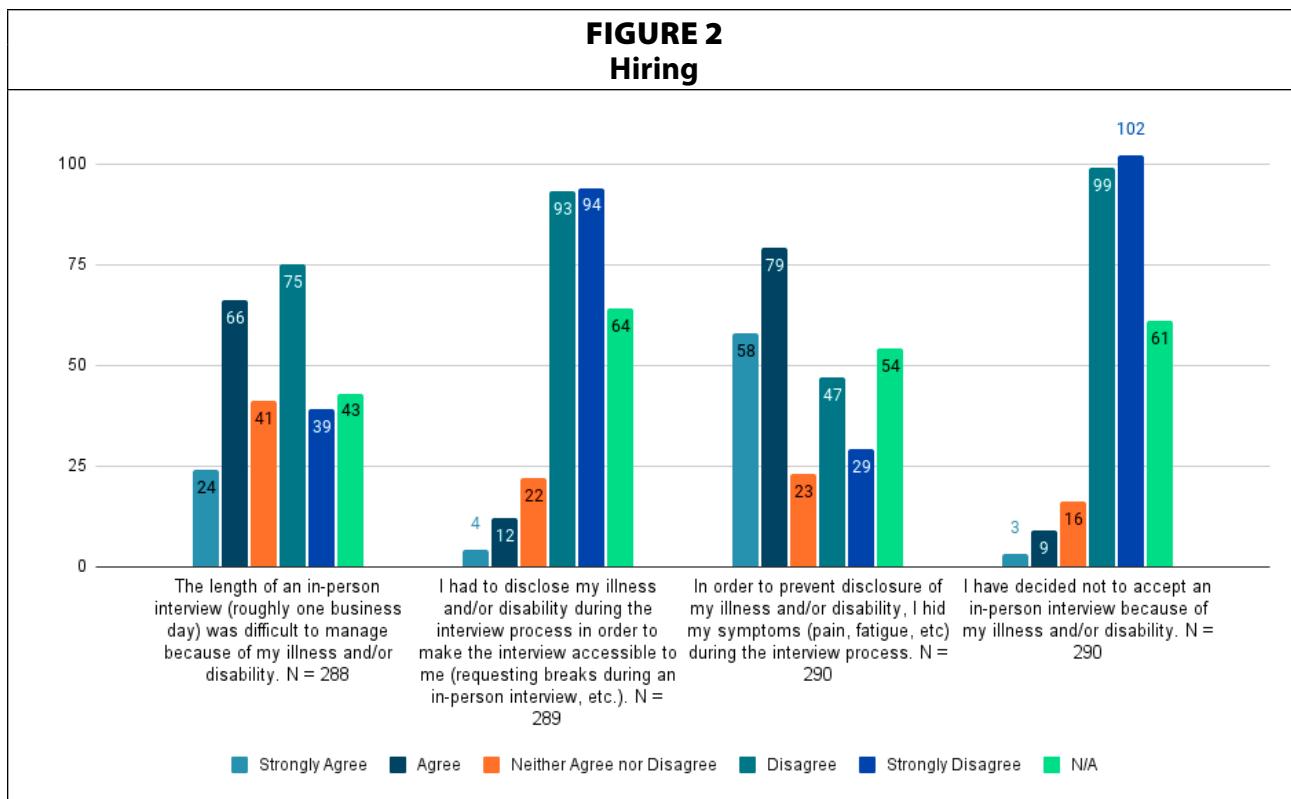
### ***Hiring Process***

Participants were asked to respond to statements regarding their experiences with the hiring process. They were asked to rank these statements on a five-point Likert scale from “Strongly Agree” to “Strongly Disagree.” Respondents could also select “Not Applicable.” Figures 1 and 2 below display the data from these questions. Respondents indicated their illness or disability was a major consideration when applying for jobs: 45 percent selected “Strongly Agree” or “Agree” when asked if they were reluctant to apply to positions with inaccessible requirements; 34 percent selected “Strongly Agree” or “Agree” to deciding against applying

**FIGURE 1**  
**Hiring**

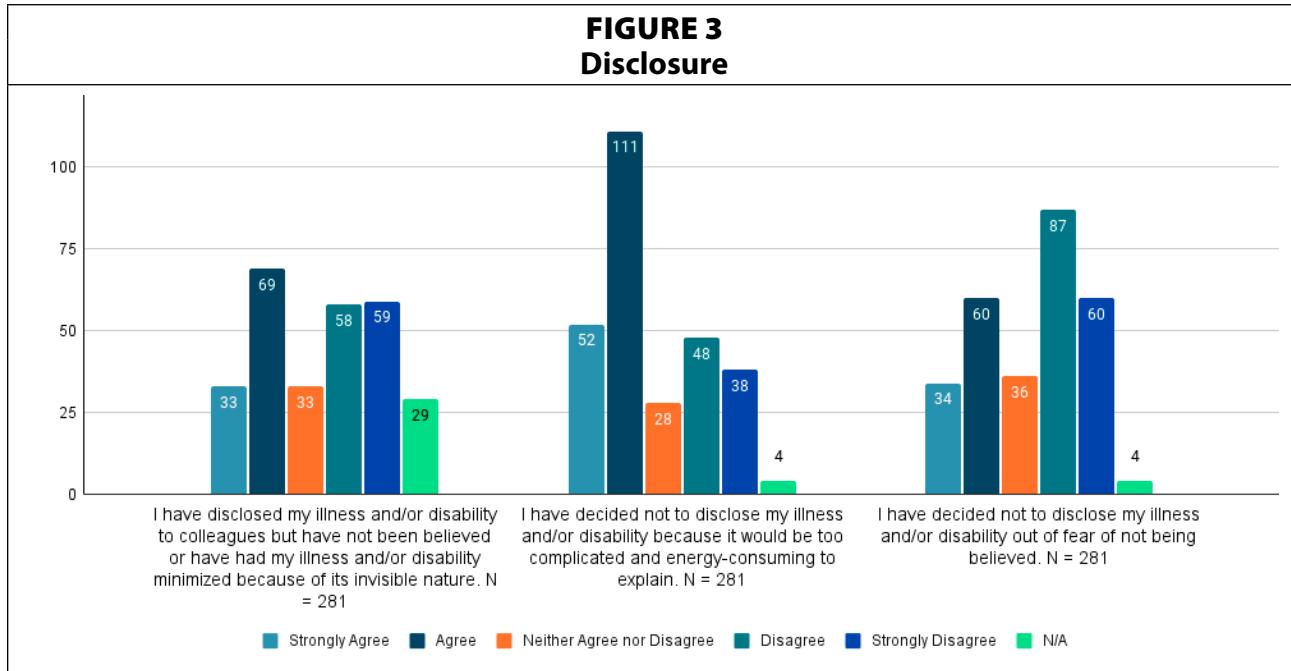


**FIGURE 2**  
**Hiring**



to positions due to inaccessible requirements. However, the responses were more mixed for the interview process. Even though 47 percent of respondents chose "Strongly Agree" or "Agree" when asked if they hid symptoms during the interview process, 65 percent selected "Strongly Disagree" or "Disagree" to needing to disclose disability to have an accessible interview process, and 69 percent chose "Strongly Disagree" or "Disagree" to rejecting an interview due to inaccessibility.

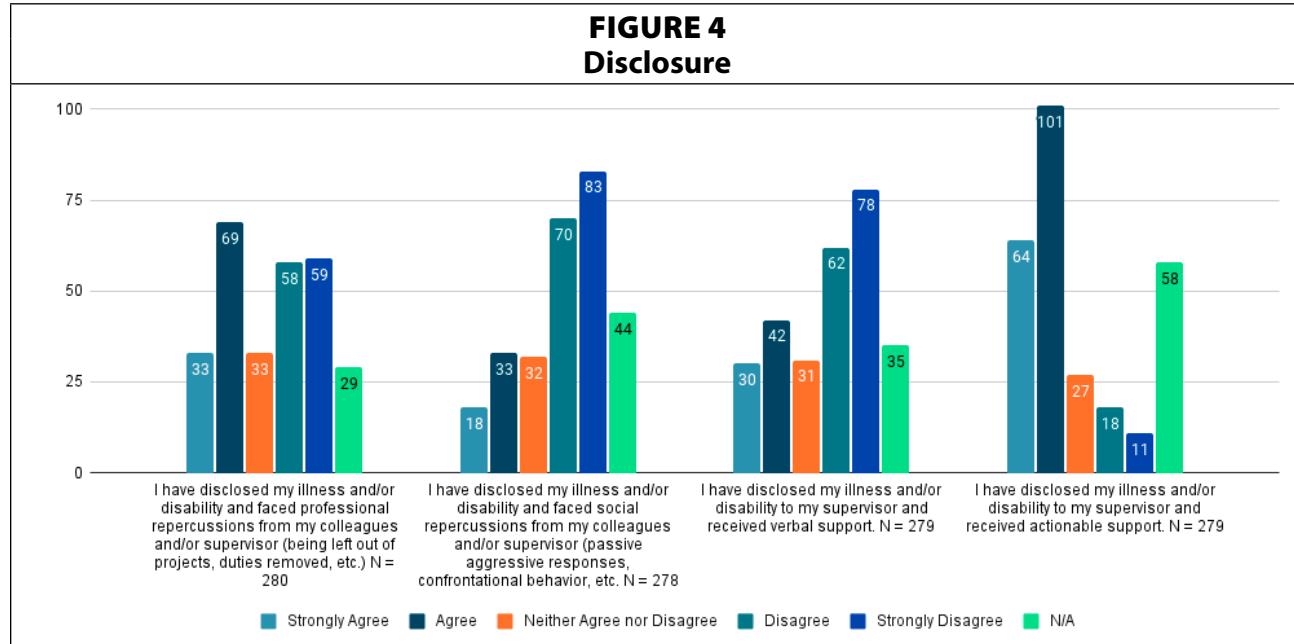
**FIGURE 3**  
**Disclosure**



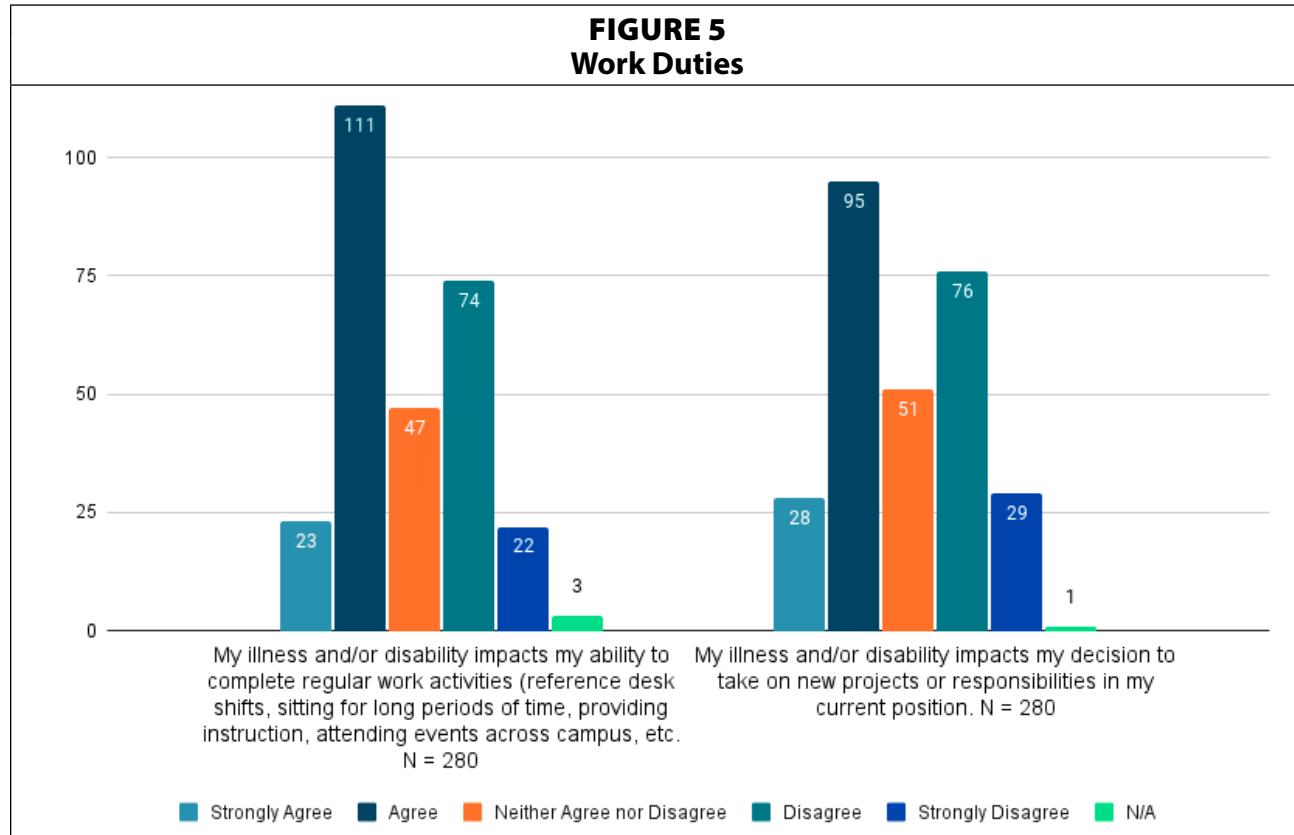
## Daily Working Experience

The next section of Likert scale questions asked respondents to respond to a series of statements regarding their daily experience working with a non-apparent illness and/or disability. Figures 3–5, below, are a series of bar graphs that represent the results. Of particular note from this section is that while only 33 percent of respondents chose “Strongly Agree” or “Agree” to not disclosing because of fear of not being believed, 58 percent did not disclose because it would be too complicated or energy consuming. Positively, 59 percent of respondents reported

**FIGURE 4**  
**Disclosure**



**FIGURE 5**  
**Work Duties**



receiving actionable support from supervisors after disclosing, and only 18 percent reported social repercussions for disclosure. However, 36 percent of respondents selected "Strongly Agree" or "Agree" to facing professional repercussions for disclosing, indicating disclosure was not met overwhelmingly with support.

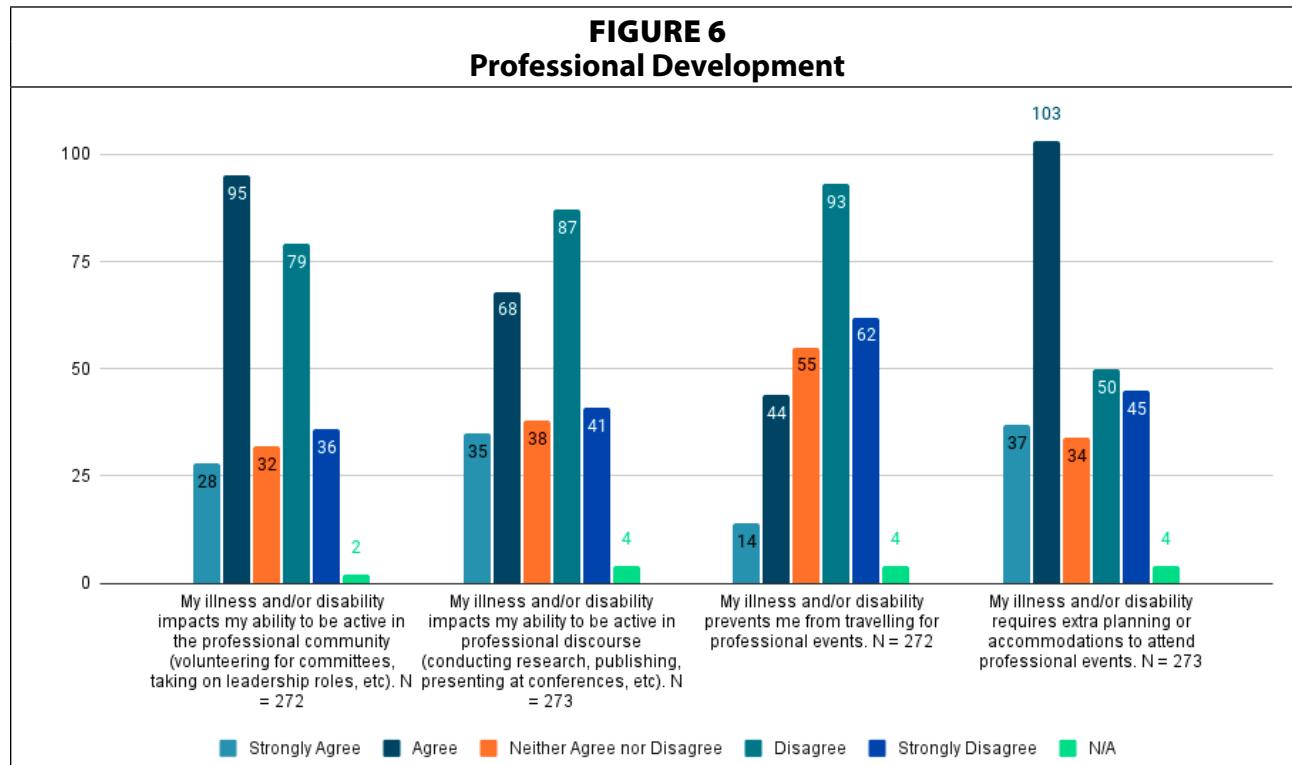
In addition to disclosure, respondents reported the impact of their hidden illness or disability on job duties. Forty-eight percent of respondents selected "Strongly Agree" or "Agree" when asked if their illness or disability impacted their ability to complete regular work tasks, like reference desk shifts or attending events around campus. Furthermore, a similar number of respondents (44 percent) agreed that their illness or disability impacted their decision to take on new roles or responsibilities within their position.

### ***Professional Development***

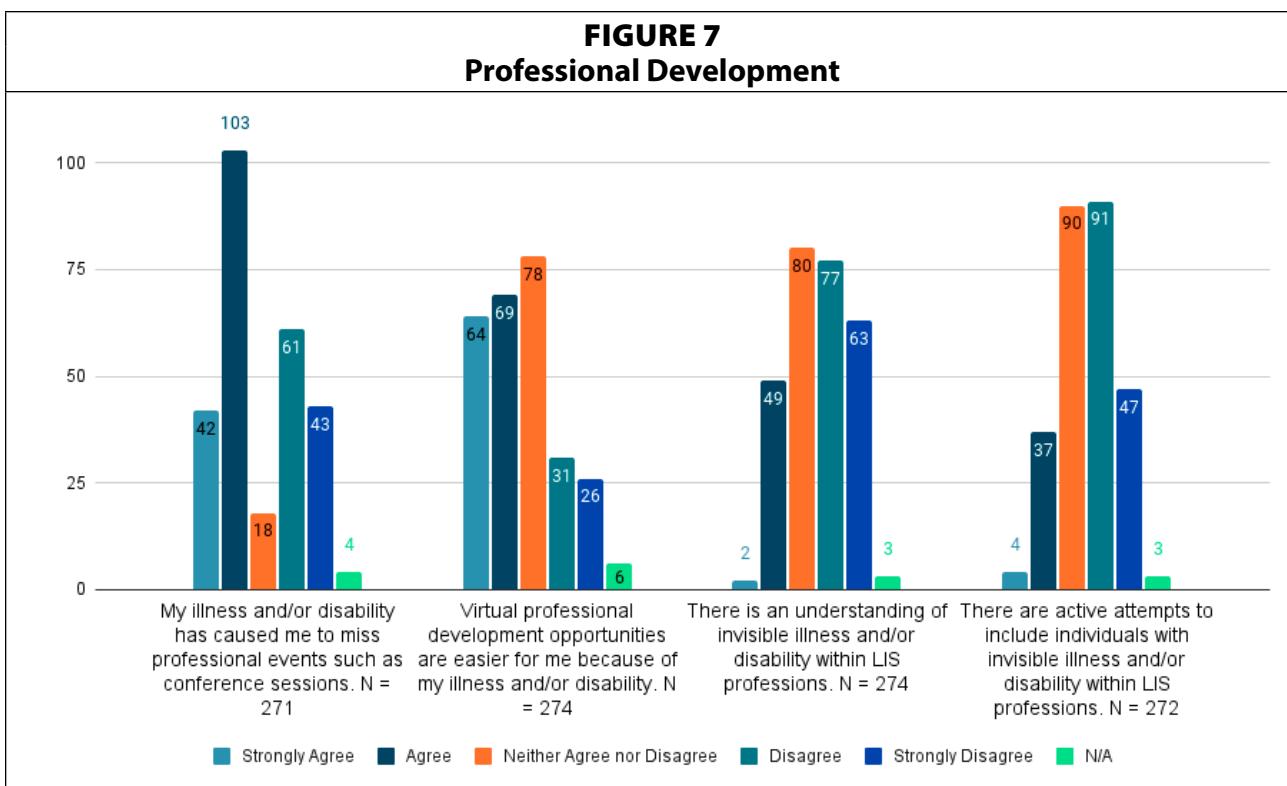
Respondents continued explaining the impact of invisible illness and disability on their lives as LIS professionals by examining their role in their professional development. They responded to statements using a Likert scale, illustrated in figures 6–8. In response to a question inquiring if their illness and/or disability impacts their ability to be active in professional service, 45 percent selected "Strongly Agree" or "Agree," while 41 percent chose "Strongly Disagree" or "Disagree." Comparatively, 38 percent of respondents selected "Strongly Agree" or "Agree" that their illness and/or disability impacted their ability to contribute to professional discourse (publishing, presenting, etc.), but 47 percent chose "Strongly Disagree" or "Disagree" to the same statement. Most significantly, 54 percent indicated they missed professional events due to their illness or disability.

This section also asked about knowledge and support across the profession. Notably, 51 percent chose "Strongly Disagree" or "Disagree" and 29 percent "Neither Agree nor Disagree" when asked if there is an understanding of invisible illness and disability in academic librarianship. Similarly, 51 percent disagreed and 33 percent neither agreed nor disagreed that there

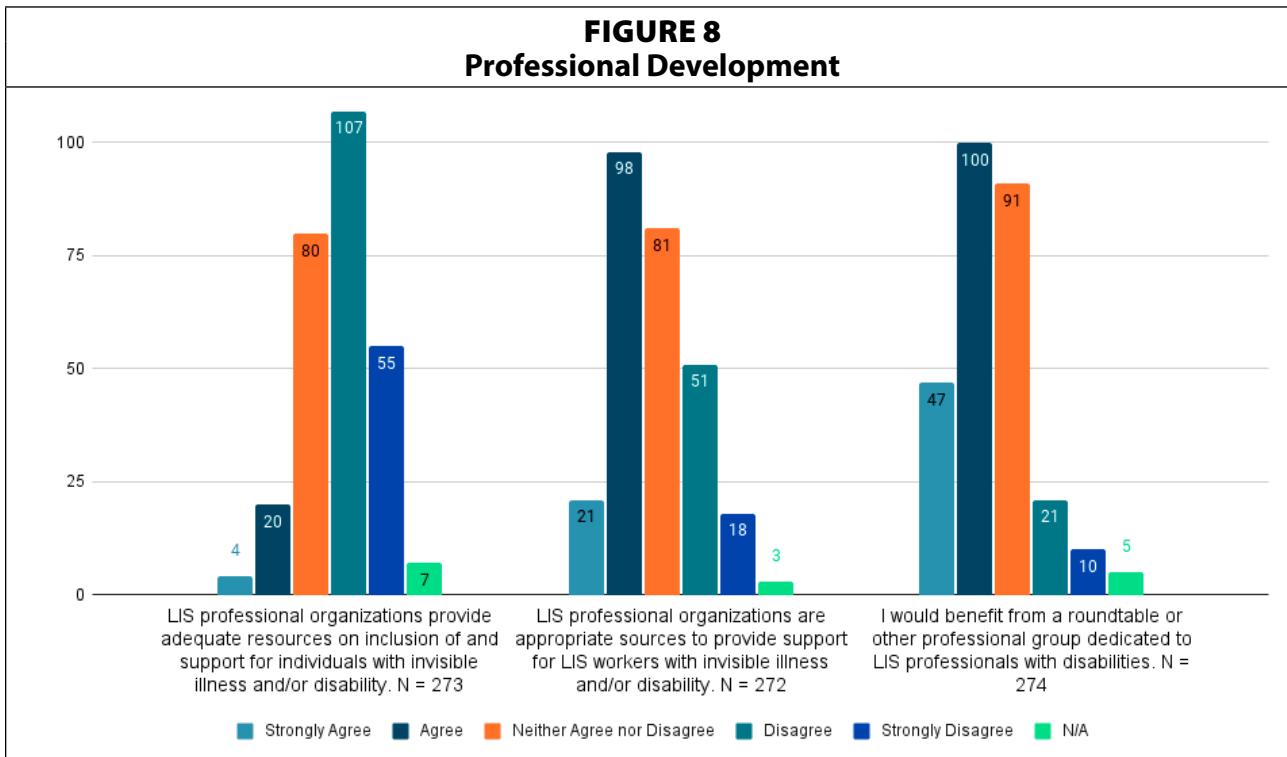
**FIGURE 6**  
**Professional Development**



**FIGURE 7**  
**Professional Development**



**FIGURE 8**  
**Professional Development**



are active attempts to include invisibly disabled individuals in the profession. However, there was no clear consensus that current library professional development organizations would be the best avenue to support academic librarians with invisible illness or disability (figure 8).

### *Requesting Accommodations*

In part 2 of the survey, respondents were asked “Have you requested accommodations for

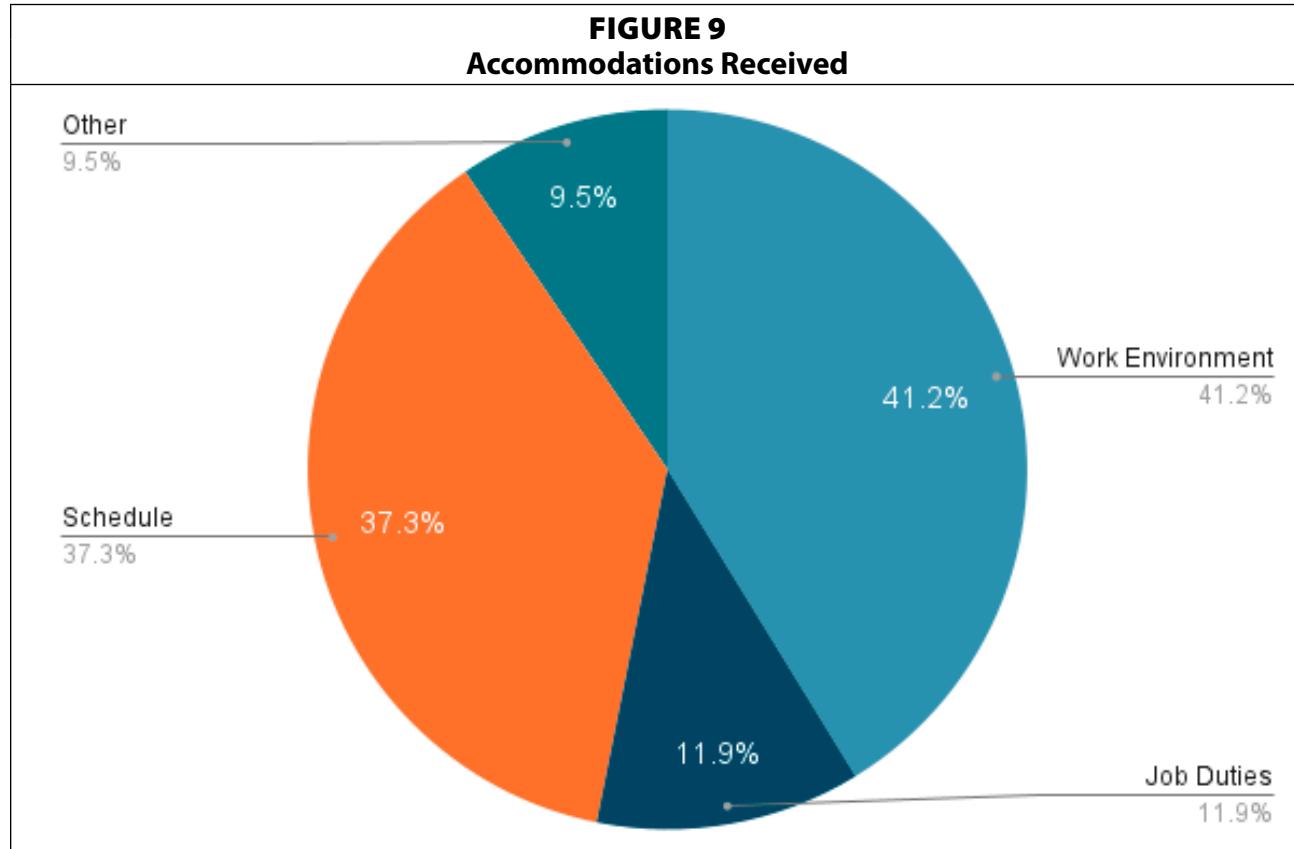
your illness and/or disability at your current institution?" Thirty-two percent of respondents selected "Yes," 61 percent selected "No," and 7 percent selected "Unsure." Through conditional logic, respondents who answered "Yes" were then asked if their accommodations had been granted. Eighty-two percent of respondents replied "Yes," 8 percent "No," and 12 percent "Unsure." The prevalence of "Unsure" in the responses indicates a lack of understanding about the accommodations process amongst some respondents. Next, respondents were asked to select all types of accommodations received from the following list: work environment, job duties, work schedule, or other (figure 9).

Lastly, those who responded "Yes" were asked to elaborate on their experience with the accommodations process in an open-ended text box. Nineteen responses were provided and analyzed. The primary themes that emerged were: (1) changes in job duties, schedule, or work environment, (2) moving from informal to formal accommodations, (3) avoiding disruption, (4) supervisor support or lack of support.

Respondents described changes to their duties, schedules, or working environment based on requesting accommodations. As one said, "I often tire easily, so sometimes I need to work from home more often than my colleagues." Work from home was described by several respondents as a requested accommodation. It should be noted that data collection occurred in May 2020, early in the Covid-19 pandemic, when many employees and employers newly navigated issues with remote work.

Multiple respondents noted that they had implemented informal accommodations that no longer were enough, which required them to request or file for formal accommodations: "After having an informal accommodation for several years with my first Supervisor, I had to go through the HR process again more recently."

**FIGURE 9**  
**Accommodations Received**

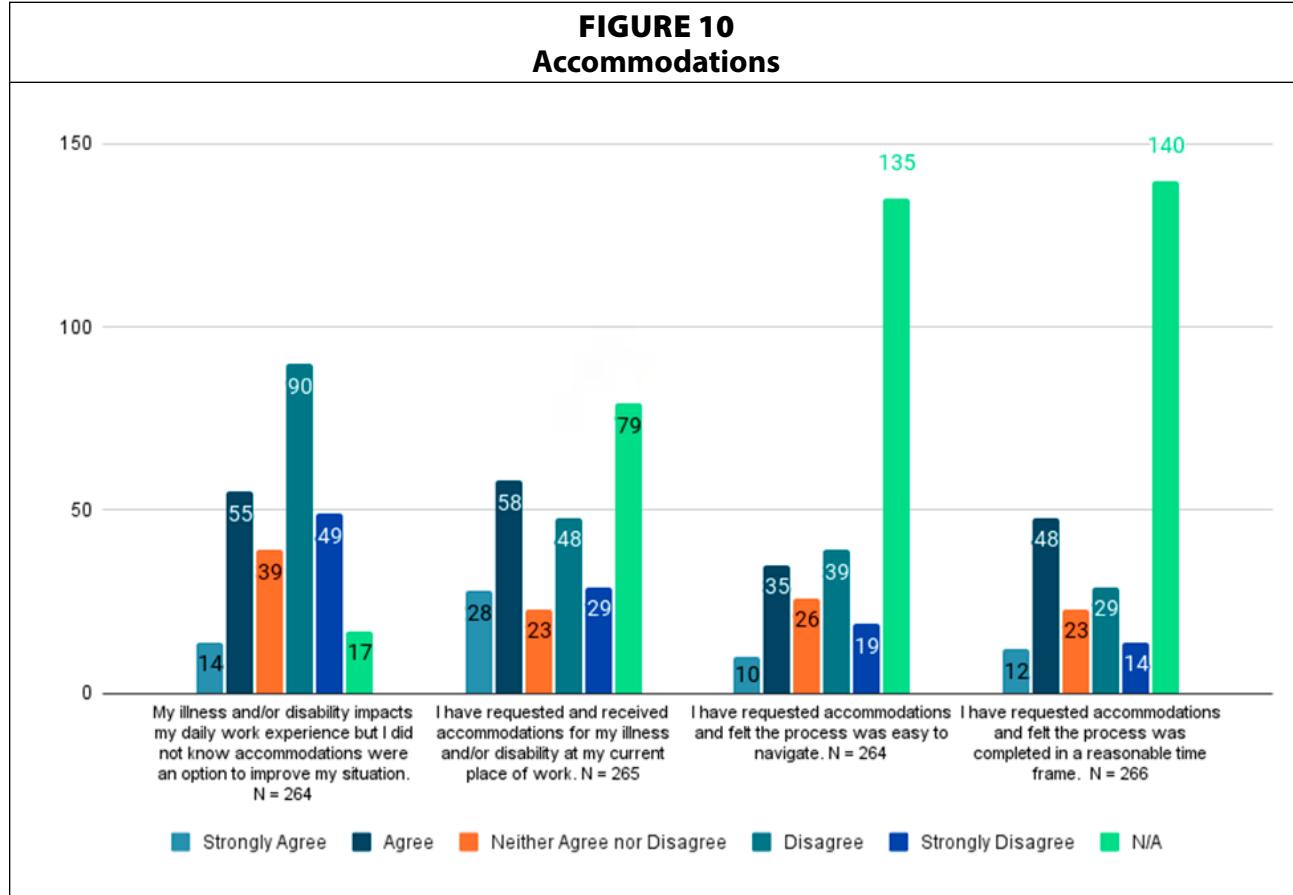


Respondents largely wanted to avoid anything that would disrupt their workplace and were cognizant of this when requesting accommodations. They mentioned wanting to continue to contribute equally, and not wanting to disrupt other employees or workflow. As one participant said, "I always try to schedule appointments when they have the least impact on my work day." Another said that even when working from home, "I am still able to 'pull my weight,' so to speak, so there is usually little disruption." However, librarians also noted that not asking for accommodations could be detrimental. As one librarian, who tried to not "hurt the department" said: "It actually hurt me in the long run because it took longer for me to recover and get back to mostly normal."

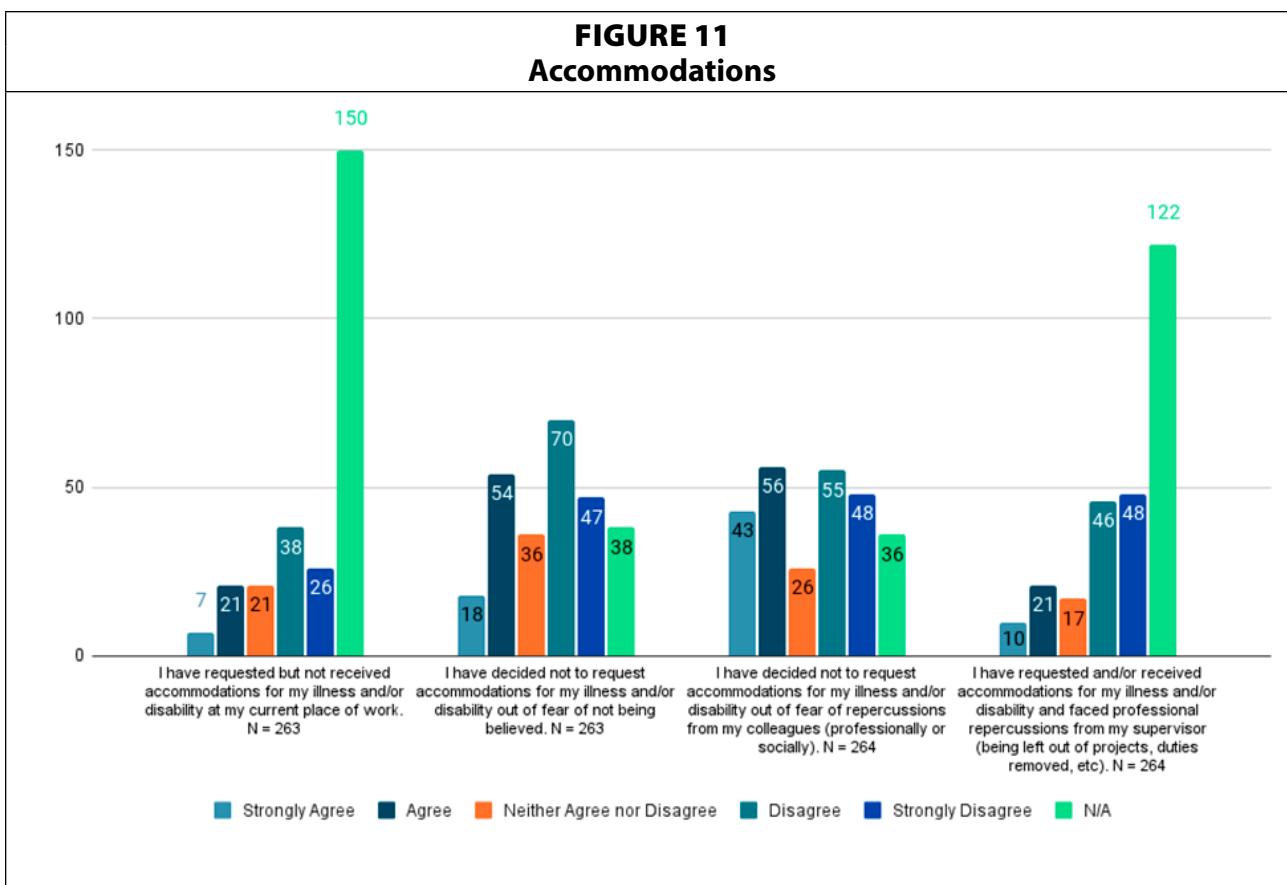
Supervisors were mentioned by many respondents, from being very supportive to being unsupportive. Supportive supervisors were described in detail by some; for example: "In all cases my boss has been very accepting and adaptable, working with me to get what I need or approving the changes I am making." However, others described unsupportive supervisors: "My boss yelled at me 'What the hell's your problem? How long do I have to put up with this?'" Finally, some respondents described supervisors who did not grant requested accommodations because activities relating to disability were "deemed essential to the job" regardless of the reality of the work. One respondent whose accommodation was denied explained, "[The supervisor] has been unsympathetic, unsupportive, and cruel in forcing me to disclose my disability and penalizing me due to my disability in office politics."

In addition to the initial questions about accommodations, respondents were asked to respond to a series of statements regarding the accommodations process using a Likert scale in Part 3 of the survey (figures 10–12). Even though 53 percent of respondents selected "Strongly

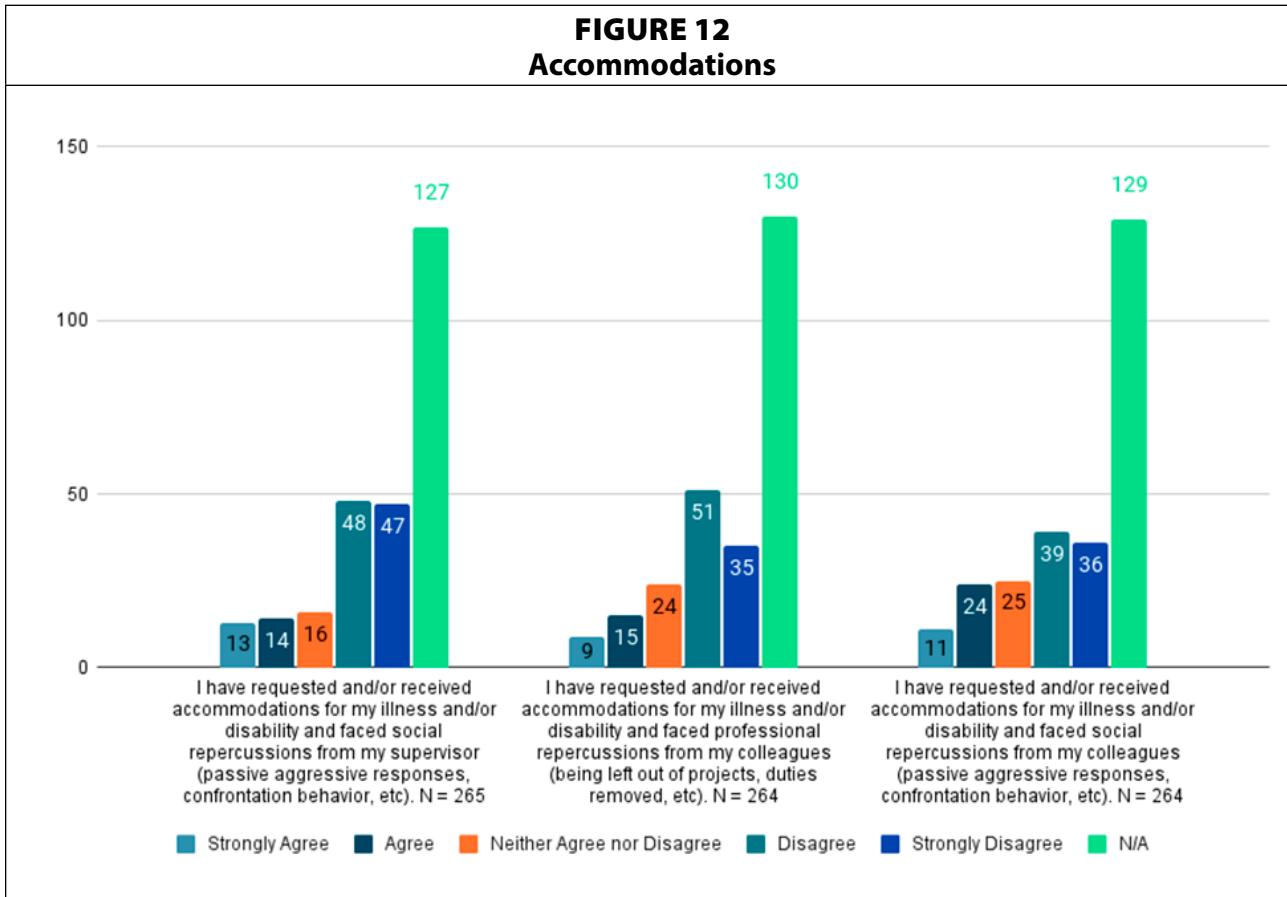
**FIGURE 10**  
**Accommodations**



**FIGURE 11**  
**Accommodations**



**FIGURE 12**  
**Accommodations**



Disagree" or "Disagree" when asked if they were unaware that accommodations were an option, "Not Applicable" was overwhelmingly the most common answer throughout the Likert questions about receiving accommodations. This is expected, considering the low percentage of respondents who selected "Yes" when asked if they received accommodations. Also notable from this section were responses related to reasons why respondents did not request accommodations. When asked if they chose not to request accommodations out of fear of not being believed, 44 percent of respondents chose "Strongly Disagree" or "Disagree," with 27 percent choosing "Strongly Agree" or "Agree" (figure 11). Responses were even more closely split when asked if they chose not to request accommodations out of fear of repercussions: 38 percent selected "Strongly Agree" or "Agree" and 39 percent selected "Strongly Disagree" or "Disagree." Though it is unclear what factors may create this close divide amongst respondents, it does indicate that many are reluctant to request accommodations due to potential negative responses from supervisors or colleagues.

## Discussion

The results of this study indicate potential barriers to the workplace for academic librarians living with invisible illness and/or disability. Concerns related to disclosure and accommodation are of particular note.

### *How does living with an invisible illness or disability impact the ability of full-time, degreed LIS professionals in academic libraries and archives to do their work?*

The results of this study demonstrate that invisible illness or disability does impact the ability of many respondents to do their work. More respondents indicated their illness or disability does impact their daily responsibilities and their decisions to take on new projects than did not (figure 5). While this is not a majority of respondents, it is significant enough to acknowledge the relationship between illness and disability and academic LIS work. There was also a gap evident between the number of respondents whose work is impacted by illness and disability, and those who sought accommodations to address those disparities.

When looking more closely at how non-apparent illness or disability impacts the ability of respondents to do their work, one area of note respondents indicated was the hiring process. In order for degreed LIS professionals to do their work in a full-time academic position, they must first navigate the often lengthy academic hiring process. Accessibility of a position was a concern for respondents when applying for full-time work: respondents were often reluctant to apply for positions that may be difficult to fulfill with their illness or disability, and some decided against applying entirely based on inaccessible requirements in a job posting (figure 1). Respondents also noted that their illness and/or disability were considerations throughout the interview process, both through requiring extra planning to travel to interviews and hiding symptoms throughout the interview process (figure 2). These responses indicate that for some, invisible illness or disability is a determining factor when acquiring a position. This concern, by extension, impacts their ability to successfully work in the field.

Once in their positions, respondents indicated that hidden illness and/or disability impacted their work by hindering participation in professional development to varying degrees. A slight majority indicated illness and disability impacted their ability to be active in professional service, with fewer saying the same for professional discourse, like publishing or presenting (figure 6). The one area that proved more commonly impacted by illness

or disability was attendance at professional events: a majority of respondents reported that they have had to miss events due to their illness or disability (figure 7). These responses do not indicate a universal impact on professional development, but they do demonstrate that invisible illness or disability affects the ability of many librarians and archivists to complete service and research. This has particular importance for academic positions, which often require professional participation and research for tenure or advancement. Inaccessibility in our professional discourse therefore may be preventing some disabled academic LIS professionals from doing essential parts of their work.

While there was not overwhelming agreement amongst respondents on how invisible illness and/or disability impacts their ability to do their work, there were clear indicators that it does impact the hiring process, regular job duties, and professional involvement for many librarians and archivists. Further research may shed light on what factors (such as type of position or disability) correlate with the level of impact on work.

### *How do degreed academic LIS professionals handle disclosing their invisible illness or disability?*

Respondents' hesitancy to disclose their illness and/or disability was identified throughout multiple choice, open-ended, and Likert Scale questions. In terms of when participants disclosed and to whom, the most commonly occurring answer was disclosing to colleagues considered close friends as their relationships developed. The personal nature of these disclosures could be because respondents felt safer in a friendship than a typical work relationship, or because disclosure occurred more naturally outside of the work environment.<sup>36</sup> Besides disclosures to friends, a majority of disclosures occurred most often when it was necessary for job duties. When disclosing to colleagues they work with regularly, direct supervisors, administration, library directors, or everyone generally (57.66 percent of disclosure occurrences reported), participants were most likely to do so when their illness and/or disability impacted their work (tables 1–8). Participants were most likely to disclose to human resources when requesting accommodations (7.9 percent). These results indicate that the majority of respondents may not feel comfortable being open about their illness and/or disability to their entire workplace community, similar to the findings of George, Price, et al. and Santuzzi et al.<sup>37</sup>

The responses in "Other" for both when and to whom they disclosed provided further nuance about potential hesitancy to disclose. These responses showed that disclosure is often situation-specific, with a number of respondents reporting selective disclosure. They only felt safe disclosing some disabilities and not others, such as physical illness but not mental illness. This was a common occurrence across the literature, notably by Bassler and Burns and Green.<sup>38</sup> In addition, some respondents disclosed when they felt forced: e.g., when tenure was threatened, when a supervisor was being discriminatory. These situational disclosures reinforce the concern that academic librarians and archivists may not be able to openly discuss invisible illness and/or disability in the workplace.

To provide additional context to disclosure, the respondents replied to Likert Scale statements regarding disclosure's impact on everyday work experiences, including fear of not being believed, complications, and more. During the hiring process, respondents did not feel they needed to disclose to receive accessible adjustments like breaks, yet still hid symptoms throughout the process (figure 2). These results demonstrate a distinct hesitancy to disclose during the hiring process, even at the potential detriment to the applicant through inaccessible procedures.

When asked about not disclosing because of a fear of not being believed once in a full-time position, respondents had very mixed experiences, with agreement closely followed with disagreement (figure 3). This aligns somewhat with findings from literature on invisible disability in the workplace, which indicates fear of being believed as the primary reason for not disclosing.<sup>39</sup> Even so, a more common reason for not disclosing in this study was because it would be too complicated and energy-consuming to explain. These results demonstrate that while there is hesitancy to disclose among academic librarians with invisible illnesses and/or disabilities, it may have more to do with an overall lack of understanding about disability in the profession than potential discrimination.

Overall, the findings regarding disclosure indicate that it is difficult for academic librarians and archivists with invisible illnesses and/or disabilities to be open about their experiences in the workplace. The respondents generally did not find disclosure worth the effort or risk in work relationships unless it was necessary for their job duties. In addition, many practiced selective disclosure based on relationship, situation, or type of disability. Further research is needed to better understand the way type of illness or disability impacts disclosure decisions, and how to provide a more secure and knowledgeable workplace where academic librarians can feel comfortable disclosing.

### *How do degreed academic LIS professionals face barriers/stigma in the workplace for their invisible illness or disability?*

The results of this study indicate that while barriers exist for academic librarians and archivists with invisible illness and/or disability, they may not be synonymous with overt stigma in the workplace. For example, withholding disclosure may prevent disabled LIS professionals from receiving accessible accommodations, but there was mixed evidence that respondents had faced stigma as a result of disclosure. Though some respondents noted professional and social repercussions after disclosure, neither were expressed across the majority of responses (figure 4). Positively, respondents also reported receiving actionable support after disclosing to a supervisor and, to a lesser degree, positive verbal responses from supervisors, which was noted as crucial for accessible workplaces in the literature.<sup>40</sup> These results indicate that when librarians did disclose, they were not often faced with stigma in the workplace. However, we cannot discount those who dealt with backlash as a result of disclosure when examining the accessibility of the profession.

Barriers for academic librarians and archivists with invisible illness and/or disability were also evident when considering the interview process. As noted above, they felt relatively negative about applying for jobs that had requirements that might be difficult for someone with an invisible disability, but most respondents still applied for potentially concerning positions (figures 1 and 2). This indicates that while job posting statements like “must be able to lift forty pounds” or other physical requirements can be a barrier to people with invisible disabilities, they do not necessarily stop all individuals from applying. However, the clear apprehension toward these requirements reflects the tension between job duties and the reality of living with an invisible illness or disability. The majority of respondents also did not let their disability stop them from accepting on-campus interviews and did not ask for accommodations during the interviews, with less than 1 percent having requested accommodations. Instead, they suffer quietly through their symptoms, which may impact their performance in the interview. In order to eliminate these potential barriers, the library profession needs to focus on creating

more equitable hiring procedures, as supported by Ford and Leonard.<sup>41</sup> These could include removing unnecessary physical requirements from job applications, providing questions in advance of an interview, providing on-campus applicants extra breaks, and offering seating for all presenters, not just the small number who may ask for accommodations. Making the hiring process more accessible to all could help prevent the barriers that are present in academic library hiring but are not being addressed through accommodations.

Beyond the hiring process, there was a clear barrier between the experience of working with an invisible illness and disability and the legal process meant to adapt work duties. Accommodations should provide people with disabilities an equal opportunity to succeed in the workplace, but this study found that they largely are not being offered to academic librarians and archivists. However, this does not mean that respondents' illness or disability did not impact their work in a way that should be alleviated by accommodations. In fact, a majority of respondents agreed that their disability impacted their ability to complete regular work assignments and their decision to take on new projects. This supports Oud's findings on the reluctance to request accommodations amongst librarians and demonstrates that the process to remove barriers to work for people with disabilities is largely not being provided to academic librarians and archivists.<sup>42</sup> Our results indicate accommodations may not be utilized by invisibly disabled academic librarians because of potential stigma. Some respondents reported fear of not being believed about their illness or disability as a reason not to request. Even more respondents indicated fear of repercussions from colleagues as to why they did not request accommodations. These results correspond with previous studies on accommodations in academia or the workplace more broadly, which demonstrated that employees with invisible disabilities were concerned about or faced stigma from their coworkers for receiving accommodations.<sup>43</sup>

The respondents who did receive accommodations were asked to share whatever they could about the process they experienced. There was evidence of potential stigma for receiving accommodations from both coworkers and supervisors in these responses. A key finding was that librarians who requested accommodations were acutely aware of their coworkers' and organizations' needs and described in detail their efforts to minimize disruption through their accommodations. This consideration was reflected often throughout the responses, yet it was not an overt theme in the initial literature review. This concern reflects awareness that their accommodation may be looked on unfavorably by their coworkers and may correspond to concern about repercussions from colleagues expressed by the respondents who did not request accommodations. It appears respondents may attempt to preempt backlash by factoring colleague concerns into their requests for accommodations, if they request them at all. Broader concerns about accounting for organizational needs in the accommodations process may be due to the unique emotional labor expectations and vocational awe recently documented in LIS literature.<sup>44</sup> Further research should be done to better understand these distinctive concerns of academic librarians and archivists, and to determine if they create a barrier to accessing accommodations.

Relationships with supervisors were also frequently mentioned by respondents when discussing their accommodations experiences, as also noted in Oud's findings.<sup>45</sup> Of the nineteen open-ended responses, seven reported supportive supervisors and three reported unsupportive supervisors. A supportive supervisor will be lauded, while librarians will have an extremely negative opinion of an unsupportive supervisor. The number of supportive supervisors mentioned is encouraging, but the negativity of the unsupportive supervisors still demonstrates a

potential barrier in the field for librarians and archivists with invisible disabilities. If even some academic library supervisors are “cruel” and “penalizing” in response to disclosure or accommodations requests, a threat of stigma or backlash will remain present throughout the field.

This study’s findings demonstrate that there are not universal barriers or stigma for all academic librarians and archivists living with invisible illness or disability, but they nonetheless exist in our profession. Most evident barriers centered around disclosure and the accommodations process, which is in line with the majority of literature on hidden disability in the workplace. All disabled librarians must feel safe disclosing and receiving accommodations for our field to be truly accessible, since both are vital to achieving an equitable workplace. Disclosure is required in some way in order to receive accommodations. When disabled individuals do not feel supported enough to disclose, they are unable to be accommodated, as discussed by Davis.<sup>46</sup> This creates layers of barriers hindering the success of academic librarians and archivists, as evident from this study’s results. Academic librarians and archivists first must find the energy, time, and security to disclose their illness or disability. They must also have a supportive supervisor to support their accommodations requests and not penalize them for asking. They then have to navigate the often difficult process of requesting accommodations, a common concern across the existing literature.<sup>47</sup> Finally, if their request is granted, they must balance the opinions of and repercussions from their coworkers with the needs of their library to ensure they are treated fairly in the workplace. These steps may be too daunting to even attempt for librarians and archivists with disabilities who are already struggling to balance work with symptoms.

The solutions to these barriers may lie in addressing the overall lack of understanding about invisible illness and disability in librarianship. Noted both by our respondents (figures 7 and 8) and in the larger literature review, there are pervasive misconceptions about the diversity of disability and the processes that exist to improve disability inclusion in the workplace. Active support for better workplace understanding is needed to address these barriers and prevent future stigma.

## Limitations

Limitations of this study include the narrow participant pool of MLIS holders working in an academic environment. This leaves out other academic library workers crucial to understanding the full picture of disability in the academic library workspace. In addition, by not asking respondents to identify their type of illness or disability (physical, mental, etc.), our data does not include some of the nuances of stigma surrounding disability. Individuals with mental illnesses may have different experiences or reservations around disclosure and accommodations than those with physical illness. We plan to expand our research following this study to help address these limitations. We will interview a portion of our survey respondents to better understand their experiences and gather more data about how the type of disability impacts workplace barriers. We also hope to reiterate our survey to a larger group of respondents, including non-MLIS holders in academic libraries and library workers in other areas of the field.

This study used Likert scale questions to learn from academic librarians and archivists about their experiences. However, acquiescence bias, in which participants tend to select a positive response over a negative response, may have led to more selection of “Strongly Agree” and “Agree” than other choices.<sup>48</sup> The study used a mix of positive and negative statements

throughout the Likert portion in order to balance out this potential effect, but findings should be interpreted with this knowledge in mind. Furthermore, the choice to primarily use quantitative questions potentially hindered our understanding of the nuances within respondent answers or experiences. Additional qualitative research will be pursued in future work to address some of the resulting gaps in findings.

## **Conclusion**

Our findings regarding the impact of disability on LIS work, decisions around disclosure, and potential barriers or stigma in the field largely align with studies completed in the LIS literature, higher education, and the workplace at large. As such, we reinforce the recommendations for a more inclusive workplace for individuals with non-apparent disabilities. First and foremost, there needs to be a better understanding of the diversity of disability by non-disabled workers and supervisors to create a more inclusive workplace culture. This can be done through regular accessibility training that aims to improve understanding of the barriers facing library workers with disabilities. Supervisors should also familiarize staff with disability concepts such as inclusive language, disclosure, Universal Design, and accommodations. In addition, professional organizations at state and national levels committed to equity, diversity, and inclusion should include more disability and accessibility-focused topics in their programming, as well as provide resources for creating accessible workplace cultures. As we continue to document the experience of library workers living with invisible illnesses and/or disability, we concurrently work to build a more inclusive profession.

## APPENDIX A. Survey

### Explanation of Study

From a review of current literature on invisible disability in librarianship, the researchers believe that this study is one of if not the first large-scale surveys to quantify the experience of librarians living with invisible illnesses and/or disabilities. As such, we have decided to keep the first survey attempt relatively small, limiting participants to Masters in Library Science (or equivalent) degree holders who work in academic institutions (either as librarians or archivists). The participants must also identify as having an invisible illness and/or disability. Our plan is to expand this survey to other library types and professionals if it is successful.

The goal of this study is to better understand the experience of academic LIS professionals working with invisible illness(es) and/or disability in order to examine the accessibility of the profession.

### Definitions

For the purpose of this survey, we will be using the following definitions of these key terms:

1. Chronic Illness: A physical, mental, or neurological condition or disease that is persistent, including episodic conditions or those with periods of remission and relapse. It may or may not be treatable or curable (adapted from [Vickers, 2000](#)).
2. Disability: A long-term, physical, mental, or neurological impairment that, “in interaction with various attitudinal and environmental barriers, hinders …full and effective participation in society on an equal basis with others” (Adapted from [United Nations Convention on the Rights of Persons with Disabilities](#), Article I).
3. Invisible (in reference to illness and/or disability): An umbrella term encompassing physical, mental, or neurological conditions with primary symptoms that are not visible from the outside or apparent to others. Regardless, these symptoms “limit or challenge a person’s movements, senses, or activities” (adapted from the Invisible Disabilities Association). Also referred to as non-visible or hidden.
4. Accommodations: A modification to a job or workplace environment that allows a person with a disability to perform essential functions (adapted from the [Americans with Disabilities Act](#)).

### Part I: Demographics

What is your age?

- 25 or younger
- 25–35
- 35–45
- 45–55
- 55 or older

What are your pronouns?

- they/them
- he/his
- she/hers
- other

What is your race or ethnicity? (check all that apply)

- White
- Black/African American
- Hispanic/Latinx
- Asian
- Native American
- Pacific Islander
- [blank]

Do you identify as having chronic illness(es)

- Yes
- No
- Unsure

Do you consider your chronic illness(es) to be invisible?

- Yes
- No
- Unsure

Do you identify as having one or more disabilities?

- Yes
- No
- Unsure

Do you consider your disability to be invisible?

- Yes
- No
- Unsure

Survey stops if the responder has not answered "yes" to one of the questions about their illness(es) or disability being invisible.

Thank you for your interest in illness and disability in academic librarianship. We are currently only seeking input from librarians with invisible or hidden illness and/or disabilities, but we appreciate your participation. We hope to eventually expand our research. For now, what made you interested in taking this survey?

## ***Part II: Librarianship***

How long have you been working as an LIS professional?

- Less than 5 years
- 5–10 years
- 10–15 years
- 15–20 years
- 20+ years

How long have you been in your current position?

- Less than 2 years
- 2–5 years
- 5–10 years

- 10–15 years
- 15–20 years
- 20+ years

Whom have you disclosed your illness and/or disability to at work? [Check all that apply]

- No one
- Colleagues I consider close friends
- Colleagues I work with regularly
- My direct supervisor (if not library director)
- Other library administrator/manager that I do not report to directly
- Library director
- Human Resources/disability office
- I am open about my illness/disability with everyone
- Other

When did you choose to disclose to [fill in depending on the ones they check]

- During the interview/hiring process
- Once I began working
- Upon receiving a diagnosis or beginning treatment
- When my illness/disability impacted my work
- As I built a personal relationship with colleagues
- When requesting accommodations
- Other

Have you requested accommodations for your illness and/or disability at your current institution?

- Yes
- No
- Unsure

If yes, the following three questions will appear:

If so, were your accommodations granted?

- Yes
- No
- Unsure

What type of accommodation did you receive? Please check all that apply.

- Work environment (furniture, office location, etc.)
- Job duties (shifting from in person to online instruction, front end to back end duties, etc.).
- Work schedule (change in hours, work from home, etc.)
- Other

Please tell us a little about that experience:

### ***Part III: Working with invisible illness and/disability***

Please respond to the following statements regarding your experience working with an invisible illness and/or disability. Rank the statements from strongly disagree to strongly agree.

Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly Agree   N/A

### Hiring Process

I have felt reluctant to apply for jobs that have requirements that might be difficult with my illness and/or disability (like lifting a certain weight).

I have decided not to apply for jobs because the requirements include things that would be difficult with my illness and/or disability (like lifting a certain weight).

My illness and/or disability required extra planning or accommodations for me to travel for in-person interviews.

The length of an in-person interview (roughly one business day) was difficult to manage because of my illness and/or disability.

I had to disclose my illness and/or disability during the interview process in order to make the interview accessible to me (requesting breaks during an in-person interview, etc.).

In order to prevent disclosure of my illness and/or disability, I hid my symptoms (pain, fatigue, etc.) during the interview process.

I have decided not to accept an in-person interview because of my illness and/or disability.

### Daily Work Experience

I have decided not to disclose my illness and/or disability out of fear of not being believed.

I have decided not to disclose my illness and/or disability because it would be complicated and energy-consuming to explain.

I have disclosed my illness and/or disability to colleagues but have not been believed or have had my illness and/or disability minimized because of its invisible nature.

I have disclosed my illness and/or disability and faced professional repercussions from my colleagues and/or supervisor (being left out of projects, duties removed, etc.).

I have disclosed my illness and/or disability and faced social repercussions from my colleagues and/or supervisor (passive aggressive responses, confrontational behavior, etc.).

I have disclosed my illness and/or disability to my supervisor and received verbal support.

I have disclosed my illness and/or disability to my supervisor and received actionable support.

My illness and/or disability impacts my ability to complete regular work activities (reference desk shifts, sitting for long periods of time, providing instruction, attending events across campus, etc.).

My illness and/or disability impacts my decision to take on new projects or responsibilities in my current position.

### **Professional Development**

My illness and/or disability impacts my ability to be active in the professional community (volunteering for committees, taking on leadership roles, etc.).

My illness and/or disability impacts my ability to be active in professional discourse (conducting research, publishing, presenting at conferences, etc.).

My illness and/or disability prevents me from travelling for professional events.

My illness and/or disability requires extra planning or accommodations to attend professional events.

My illness and/or disability has caused me to miss professional events such as conference sessions.

Virtual professional development opportunities are easier for me because of my illness and/or disability.

There is an understanding of invisible illness and/or disability within LIS professions.

There are active attempts to include individuals with invisible illness and/or disability within LIS professions.

LIS professional organizations provide adequate resources on inclusion of and support for individuals with invisible illness and/or disability.

LIS professional organizations are appropriate sources to provide support for LIS workers with invisible illness and/or disability.

I would benefit from a roundtable or other professional group dedicated to LIS professionals with disabilities.

### **Accommodations**

My illness and/or disability impacts my daily work experience, but I did not know accommodations were an option to improve my situation.

I have requested and received accommodations for my illness and/or disability at my current place of work.

I have requested accommodations and felt the process was easy to navigate.

I have requested accommodations and felt the process was completed in a reasonable time frame.

I have requested but not received accommodations for my illness and/or disability at my current place of work.

I have decided not to request accommodations for my illness and/or disability out of fear of not being believed.

I have decided not to request accommodations for my illness and/or disability out of fear of repercussions from my colleagues (professionally or socially).

I have requested and/or received accommodations for my illness and/or disability and faced professional repercussions from my supervisor (being left out of projects, duties removed, etc.).

I have requested and/or received accommodations for my illness and/or disability and faced social repercussions from my supervisor (passive aggressive responses, confrontation behavior, etc.).

I have requested and/or received accommodations for my illness and/or disability and faced professional repercussions from my colleagues (being left out of projects, duties removed, etc.).

I have requested and/or received accommodations for my illness and/or disability and faced social repercussions from my colleagues (passive aggressive responses, confrontational behavior, etc.).

## APPENDIX B. Dataset

The dataset from this study is available at the following DOI: <https://doi.org/10.15786/17161328.v1>. Open-ended responses have been removed to protect the anonymity of respondents.

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# So You Want to Be a Leader? Examining Pathways to Special Collections Administration

Sarah M. Horowitz and Colleen W. Barrett

This article seeks to understand the current state of the field of special collections library administration in the United States. Using a dataset gathered through publicly available information about special collections directors from the Association of Research Libraries (ARL), Independent Research Libraries Association (IRLA), and the Oberlin Group institutional members, the authors explore the educational backgrounds of directors, the types of positions they held prior to taking on their current roles, and the effect of gender on leadership advancement. This article also discusses the similarities and differences between institution types as well as promotions within institutions and across types of institutions.

## Introduction

Special collections educational programs may prepare librarians and archivists to get their first position, but they offer little guidance on career advancement and the skills and background necessary for special collections leadership. That preparation often comes anecdotally at conferences and through conversations with colleagues or mentors. Since there is little formal leadership and management training for many library administrators, the authors wanted to explore what educational backgrounds and professional pathways were most likely to lead someone to special collections administration. Given the recent focus on the historical feminization of the profession, the authors were also interested in seeing how gender may impact administrative prospects for special collections practitioners. Questions specifically explored were whether those backgrounds and pathways could change depending on institutional type, if administrators must commit to changing institutions and geographic areas to advance, and how easy it is to move between institution types; these findings were also compared according to the administrator's gender.

Findings reveal that the most common degrees for special collections administrators are the MLIS with a second, subject-related master's degree. A wide variety of professional backgrounds can lead to special collections leadership, but those based purely in public services are underrepresented. While there are more women leaders in this data set than men, women are not represented at the same level that would be expected given their predominance in the profession. This glimpse into the state of current special collections leadership in the United

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States can serve as a foundation on which to build future research on the role and background of special collections administrators and pathways to special collections leadership.

## Literature Review

Much is still unexplored in the literature about promotion, administration, and leadership in special collections departments and institutions. While it is generally accepted wisdom that special collections librarians need a subject master's degree in addition to an MLIS and must be willing to geographically relocate to advance in the field, this has not been studied in a comprehensive way. Neither has the population of those with PhDs as opposed to MLIS degrees in the field, especially since the advent of the CLIR post-doctoral program designed to give humanities PhD graduates the "chance to develop research tools, resources, and services while exploring new career opportunities."<sup>1</sup> Literature on promotion, administration, previous types of experiences, and gender in library leadership tends to focus on library directors rather than on special collections. This literature review considers studies of libraries, rare books, manuscripts, and archives, as these can all fall under the heading of special collections.

Professional organizations do not currently offer an official stance on the ideal type and number of degrees required of a special collections administrator. The Rare Book and Manuscripts Section (RBMS) of the Association of College and Research Libraries publishes competencies for special collections practitioners. The RBMS Competencies do not specify how any of these competencies are to be acquired, instead noting that "While this document does not assume that a degree in library and information studies is required for appointment at the professional level, it recognizes the important role played by library schools in creating a knowledge base.... Advanced subject degrees may be appropriate as an additional qualification for specialized positions."<sup>2</sup> The Competencies also include a section on management, supervision, and leadership, which, with 14 guidelines, is the longest section in the document. The Society of American Archivists Guidelines for a Graduate Program in Archival Studies also include leadership and administration as one concept that is part of core archival knowledge.<sup>3</sup> This document differs from the RBMS document in that it is specifically aimed at educational programs centered on archival studies. The Academy of Certified Archivists, which notes that their members find certification useful for "increasing career opportunities," requires a master's degree of some kind to qualify for certification but does not specify what type.<sup>4</sup>

Previous studies provide some information about education for general library administration and leadership. Many of these focus on library directors at ARL institutions. Condic found that the number of ARL directors who held an MLIS and another master's was equivalent to the number who held an MLIS degree alone. While ARL library administrators in 2019 were less likely to hold MLIS degrees than in previous studies, the number holding PhDs remained the same.<sup>5</sup> Studies have also explored education for special collections practitioners more generally. In a study of entry-level special collections positions between 2004 and 2009, an MLIS degree was required just over 50% of the time, while a second master's degree was required 8% of the time and a PhD 1%. Among job ads that included preferred degree qualifications, 82% wanted a specialized advanced degree beyond the MLIS.<sup>6</sup> A study of job ads for archivists from 2006 to 2014 found that 68% required a master's degree.<sup>7</sup> The MLIS is still the most common degree for special collections librarians: 89% of those responding to the 2015 RBMS membership survey hold one. Within the same survey, department heads of special collections were most likely, of all the professional subfields, to have a subject mas-

ter's degree. The RBMS survey also found that "although only 11% of all respondents hold a doctoral degree, 40% of associate or assistant directors, 35% of library directors, and 35% of curators of 'mixed or other formats' report having this degree ...[W]hile men make up just 23% of survey respondents, they account for half of doctoral degrees."<sup>8</sup>

Literature on career paths to special collections administration is scarce, as are specific studies of the types of requirements for positions in various special collections fields. When Colleen S. Harris explored whether library administrators at baccalaureate degree granting institutions perceived their previous positions as preparation for leadership roles, she found no particular path or position that those surveyed found especially helpful.<sup>9</sup> Forty one percent of ARL library directors who responded to a survey indicated that they believed it was necessary for them to earn an additional degree beyond the MLIS in order to achieve their positions as administrators.<sup>10</sup> While the skills needed for special collections administrators no doubt differ from that of those working in special collections at large, Hansen found that entry-level positions most often listed skills and qualifications related to a variety of areas, with management and administration being the fifth most common, required in one-third of the job ads and preferred in two-thirds.<sup>11</sup> It is interesting to note that management and administration is a part of so many entry-level job requirements, meaning that many special collections librarians may be gaining this experience early in their careers, and thus be well-prepared for leadership roles both within and beyond special collections. Warren and Scoulas found that almost all special collections public services job advertisements that they reviewed required supervisory experience, suggesting that this is common in this section of the field.<sup>12</sup>

There are numerous studies of gender, library directors, and leadership, usually focusing on ARL libraries and almost exclusively on white women rather than minority leaders.<sup>13</sup> Although there are far more women in academic library leadership positions than in previous years, women are underrepresented as leaders;<sup>14</sup> 83% of librarians are women, but women hold only 58% of management positions in ARL libraries.<sup>15</sup> While women hold the majority of library directorships,<sup>16</sup> these numbers do not achieve parity with the percentage of women in the library/archives field overall. There have not been similar in-depth studies of special collections administrators, but surveys from membership organizations provide relevant data. A survey conducted by the Women Archivists Section of the Society of American Archivists (SAA) in 2017 found that 82% of the archivists surveyed identified as women.<sup>17</sup> In the most recent survey of RBMS membership in 2015, women made up 74% of the respondents, an increase from the previous survey of fifteen years before.<sup>18</sup> In the same RBMS survey, men held 30% of the library director positions, 40% of the associate or assistant director positions, and 38% of department head positions; 39% of male respondents were administrators of some kind, while only 30% of women were.<sup>19</sup> The work of early women special collections librarians has often been elided or uncredited,<sup>20</sup> meaning that it is harder to trace their contributions to the field, and a distinction between the roles typically held by men and those by women may still continue. There is wide agreement between special collections administrators and their reports about the value and goals of the special collections profession; however, women feel more strongly than men about creating relationships with other departments outside of special collections.<sup>21</sup> Women library managers report doing more emotional labor than their male colleagues.<sup>22</sup> Women library staff also feel that male leadership receives more institutional support than female leadership.<sup>23</sup>

Studies have also explored why librarians take other positions, and interest in promotion and administration is one reason. Promotion and salary are important reasons why librarians leave institutions and take other positions,<sup>24</sup> the RBMS membership survey found that those with second master's or PhDs earned higher salaries and that men had higher salaries than women.<sup>25</sup> Better opportunities for career development and growth are important factors in librarians' decision to take new positions.<sup>26</sup> The few opportunities for advancement, or feeling "stuck," can lead to burnout and librarians leaving positions or the field entirely.<sup>27</sup>

## Methodology

Data were collected between January 18, 2021, and March 2, 2021, after the University of Kentucky IRB determined that the project was not human subject research on January 15, 2021. The authors decided to focus on three groups in their analysis: The Association of Research Libraries (ARL), the Independent Research Libraries Association (IRLA), and the Oberlin Group. ARL is "a membership organization of libraries and archives in major public and private universities, federal government agencies, and large public institutions in Canada and the US."<sup>28</sup> Most ARL libraries are part of larger academic institutions and are Research 1 or other advanced degree-granting institutions. There are 125 members in the United States and Canada. IRLA was founded "to address the future of independent, privately supported research libraries;"<sup>29</sup> most of its members are not affiliated with larger institutions. There are nineteen members, mainly located in the United States. The Oberlin Group is an organization of leading liberal arts college libraries.<sup>30</sup> Most Oberlin Group institutions have no graduate programs and are teaching- rather than research-focused. There are eighty members, all located in the United States. Although some Historically Black Colleges and Universities (HBCUs) are included on the ARL and Oberlin Group lists, a majority of them are not included in this dataset.

The authors chose these three groups for a variety of reasons. First, each had an easily accessible list of members, which helped to prevent the inclusion or exclusion of any specific institutions based on unintentional biases the authors hold, whether related to geography, size, perceived prestige, public/private funding status, etc. Each group also represented a specific type of organization, meaning the authors could compare data across the different types of institutions. Although these three lists limit the types of institutions studied—for instance, mid-sized, non-flagship state institutions appear on none of them—the authors determined that using existing lists would be helpful for future comparative research. The lists are also well known in the special collections community. This is not the first study to combine these groups; the 2010 OCLC "Taking Our Pulse" survey used these three groups in addition to the Canadian Association of Research Libraries (CARL) and the Research Libraries Group (RLG) partnership.<sup>31</sup> While many leadership studies focus on ARL libraries, the authors did not want to limit themselves given that the group is not representative of all special collections work.

For each institution in the selected groups, the authors searched the library website to identify the head of special collections (or similar title), relying on library directories and organizational charts. In all of these datasets, in cases where the authors could either not identify a position such as head of special collections or could not find the name of the person holding it, the authors labeled this "unfound." If the position was open, the authors labeled it "vacant." For the Oberlin Group dataset, the authors knew that many libraries would be too small to have a true head of special collections. The authors thus decided to include libraries from this list only if they had at least three people in a special collections department. This

allowed the authors to identify people whose jobs include both intellectual and strategic leadership for special collections, as well as supervision of staff, tasks similar to those of the heads of institutions on the other organizational lists.

The authors included only special collections departments or libraries that reported to the library administration in the ARL and Oberlin Group datasets. The authors did not include independent libraries affiliated with academic institutions located on their campuses that did not report through library administration (unless they were IRLA members, in which case they appear in that dataset); for example, the Harry Ransom Center at the University of Texas at Austin does not, according to online organizational charts, report to the University Libraries, so it is not included here. The authors also did not include library or archives branches of NARA or any Canadian institutions in the dataset given the differences in hiring in governmental and non-US institutions. In several cases in both the ARL (nine) and Oberlin Group (one) datasets, the authors identified more than one special collections library or department per institution. In order not to skew the data set toward one institution's hiring preferences, the authors included no more than three special collections libraries or departments per institution. The authors tried to include the largest and most general special collections, as they could determine this information, for each institution.

After identifying the name of a head of special collections, the authors used their institutional profile, LinkedIn, and Google searches for information such as press releases about new appointments to identify the degrees they held and their three most recent positions, including the title of each position, institution, and type of position.<sup>32</sup> The authors also inferred gender presentation based on pronouns listed on websites and other available information; the authors were prepared to include non-binary and trans identifying librarians in this analysis, but did not find any in the dataset using the selected search means. The authors had also hoped to include race in this analysis but were unable to ethically or responsibly determine this information through their chosen method of data collection. When identifying degrees, the authors recorded whether the person had one of the following: MLIS, MA, MLIS and MA, MLIS and PhD, and PhD.<sup>33</sup> The authors also recorded when they could not find this information. They did not record information on whether the person was or had been a certified archivist (CA). The authors attempted to identify the last three positions prior to their current job for each head of special collections in the dataset. They did not include internships, student worker positions, or part-time jobs in this analysis if they were identified as such.

After identifying previous positions, the authors coded each as one of the following based solely on the position title: administrative, public services, technical services, curatorial, mixed, administration-public services, administration- technical services, administration-curatorial, and other. The authors described administrative jobs as being a head or assistant head of a department. Public service jobs were those with titles that involved research support, reading rooms, and instruction; technical services positions focused on processing, cataloging, and metadata; and curatorial positions focused on collecting and collection building, including the position of university archivist. Mixed jobs involved multiple areas already identified. Administrative hybrid jobs were those aligned with a specific aspect of special collections work, such as "head of technical services." Other indicated something not listed, such as a research librarian outside of special collections or a teaching faculty position.

Throughout the data collection and coding process, the authors consulted on any questions to make sure that they were coding materials the same way. Each author also reviewed

the coding done by the other to be sure they were in agreement. Following coding, results were analyzed using Excel and basic statistical analysis.

## Results and Discussion

### *Overall Dataset*

Of the 116 ARL special collections departments investigated, 105 position holders (90.5% of the dataset) were identified, while 10 were unknown or unclear (8.6%) and 1 was vacant (0.9%). There were nine institutions where multiple departments were recorded as discussed in the methodology section.<sup>34</sup> Of the eighteen IRLA institutions investigated, 14 position holders (77.8% of the dataset) were identified, while 3 were unknown or unclear (16.7%) and 1 was vacant (5.6%). Of the eighty-one Oberlin group departments investigated, forty-two fit into our research parameters of having three or more staff members in the department (51.9% of the group). Of the institutions that the authors included in the dataset, 39 position holders (92.9% of the dataset) were identified, while 3 were unknown (7.1%). Only one Oberlin Group institution fell within the study's parameters for investigating multiple departments.<sup>35</sup>

### *Gender Overall*

Of the 105 ARL institutions with position holders, 70 (66.7%) had a presumed gender of female and 35 (33.3%) male. Of the 14 IRLA institutions with position holders, 2 (14.3%) had a presumed gender of female and 12 (85.7%) male. Of the 39 Oberlin Group institutions with applicable position holders, 22 (56.4%) had a presumed gender of female and 17 (43.6%) male. Combined, of the 158 positions investigated, 94 (59.5%) had a presumed gender of female and 64 (40.5%) male. These numbers show that special collections administrators conform to the national trend, outlined in the literature review section, of having more men in administrative positions than would be expected based on their numbers in the field of librarianship as a whole.

### *Educational Background*

Of the 105 ARL institutions with position holders, degrees held were identified for 88 (83.8% of the dataset). Of those 88 position holders, 23 (26.1%) held only a MLIS, 6 (6.8%) held only a MA, 33 (37.5%) held a MLIS and MA, 11 (12.5%) held a MLIS and PhD, and 15 (17%) held only a PhD. Of the 14 IRLA institutions with position holders, degrees held were identified for 13 (92.9% of the dataset). Of those 13 position holders, 3 (23.1%) held only a MLIS, 1 (7.7%) held only a MA, 1 (7.7%) held a MLIS and MA, 1 (7.7%) held a MLIS and PhD, and 7 (53.8%) held only a PhD. Of the 39 Oberlin Group institutions with applicable position holders, degrees held were identified for 33 (84.6% of the dataset). Of those 33 position holders, 7 (21.2%) held only a MLIS, 4 (12.1%) held only a MA, 17 (51.5%) held a MLIS and MA, 2 (6.1%) held a MLIS and PhD, and 3 (9.1%) held only a PhD (see table 1). Combined, of the 134 position holders with degrees held that were identified, 33 (24.6%) held only a MLIS, 11 (8.2%) held only a MA, 51 (38.1%) held a MLIS and MA, 14 (10.4%) held a MLIS and PhD, and 25 (18.7%) held only a PhD.

A majority of administrators in both the ARL group (67 of 88, 76%) and the Oberlin group (26 of 33, 79%) hold an MLIS with or without an additional degree. Several IRLA administrators do as well, although they are not a majority (5 of 13, 38%). In both the ARL and the Oberlin Group data, the combination of MLIS and MA was the most common, sug-

<b>TABLE 1</b> <b>Educational Background*</b>						
	<b>ARL</b>		<b>IRLA</b>		<b>Oberlin</b>	
	#	%	#	%	#	%
MLIS	23	26%	3	23%	7	21%
MA	6	7%	1	8%	4	12%
MLIS and MA	33	38%	1	8%	17	52%
MLIS and PhD	11	13%	1	8%	2	6%
PhD	15	17%	7	54%	3	9%

\*Percentages have been rounded up to the nearest whole percentage.

gesting that some combination of library and subject-specific education is valued for special collections administrators. Conversely, in the IRLA data, PhDs were the most common degree, which may reflect the strong subject orientation of many IRLA institutions and the specialized contents of their collections. These data indicate that the commonly received wisdom that special collections practitioners need a second degree beyond an MLIS does seem to hold true for a majority of special collections administrators, while also showing that the skill sets provided by an MLIS are clearly valued by hiring committees.

The number of PhDs that appear throughout the dataset suggest that the subject expertise, respect from teaching faculty, and prestige of a PhD are also valued by hiring committees and institutional administration.

### *Gender and Educational Background*

Of the 61 women in the ARL dataset, 18 (29.5%) held only a MLIS, 5 (8.2%) held only a MA, 25 (40.9%) held a MLIS and MA, 5 (8.2%) held a MLIS and a PhD, and 8 (13.1%) held only a PhD. Of the 27 men in the ARL data set, 5 (18.5%) held only a MLIS, 1 (3.7%) held only a MA, 8 (29.6%) held a MLIS and MA, 6 (22.2%) held a MLIS and PhD, and 7 (25.9%) held only a PhD. For both men and women, the most common degree combination was that of MLIS and MA. When looking at the ARL data, men were more likely to hold a PhD than were women (almost 50% of the total positions), while fewer than 25% of the female directors had PhDs.

Of the two women in the IRLA dataset, one (50%) held only a MLIS, while the other (50%) held a MLIS and MA. Of the 11 men in the IRLA dataset, 2 (18.1%) held only a MLIS, 1 (9.1%) held only a MA, 1 (9.1%) held a MLIS and PhD, and 7 (63.6%) held only a PhD. Once again, it is more common for male directors to hold PhDs than for women to do so.

Of the 20 female Oberlin Group directors, 4 (20%) held only a MLIS, 2 (10%) held only a MA, 11 (55%) held a MLIS and MA, 1 (5%) held a MLIS and PhD, and 2 (10%) held only a PhD. Of the 13 male Oberlin Group directors, 3 (23.1%) held only a MLIS, 2 (15.4%) held only a MA, 6 (46.2%) held a MLIS and MA, 1 (7.7%) held a MLIS and PhD, and 1 (7.7%) only held a PhD. The MLIS and MA combination is once again the most common educational background. Data within the Oberlin Group institutions show that the percentage of men and women holding at least a PhD is much closer than in ARL or IRLA libraries; Oberlin Group special collections administrators also hold fewer PhDs overall. The smaller number of PhDs may correlate with the lack of graduate students at Oberlin group institutions, and therefore a perception that less subject expertise is needed.

When all three institution types were combined, of the 83 female directors with identified degrees 23

**TABLE 2**  
**Gender and Educational Background\***

	<b>Female</b>		<b>Male</b>	
	#	%	#	%
MLIS	23	28%	10	20%
MA	7	8%	4	8%
MLIS and MA	37	45%	14	28%
MLIS and PhD	6	7%	8	16%
PhD	10	12%	15	29%

\*Percentages have been rounded up to the nearest whole percentage.

(27.7%) held only a MLIS, 7 (8.4%) held only a MA, 37 (44.6%) held a MLIS and MA, 6 (7.2%) held a MLIS and PhD, and 10 (12%) held only a PhD. Of the 51 male directors, 10 (19.6%) held only a MLIS, 4 (7.8%) held only a MA, 14 (27.5%) held a MLIS and MA, 8 (15.7%) held a MLIS and PhD, and 15 (29.4%) held only a PhD (see table 2).

In the overall dataset, the authors see that special collections administrators who they identified as male held a PhD more than twice as often than those the authors identified as female (those holding at least a PhD were 20% of women and 45% of men). While it is not possible to determine the reason for this discrepancy using this dataset, PhDs have far more prestige than an MLIS throughout academia. In a feminized profession where men still hold a greater percentage of leadership roles than their overall numbers in the profession would predict, it is interesting to see that men more often do not have to have the most traditional library credential when they advance to leadership in special collections. This finding indicates the complicated interplay of gender, degree prestige, and advancement within the special collections field.

### ***Previous Professional Background***

Of the ARL institutions for which the authors could identify a position holder (105), the authors were able to identify a most recent previous position type for 82 (78.1%). Of those identified, 36 (43.9%) were administrative, 3 (3.7%) public services, 4 (4.9%) technical services, 12 (14.6%) curatorial, 6 (7.3%) mixed, 8 (9.8%) administration-technical services, 7 (8.5%) administration-curatorial, and 6 (7.3%) other. Of the most recent positions that were not solely administrative, then, fewer than 4% came from public services, while 14.7% were from technical services, and 23.1% were curatorial. The authors also aggregated data for the three most recent positions held by ARL directors.<sup>36</sup> Of the total ARL position types for all three previous positions collected, 60 (30.6%) were administrative, 16 (8.1%) public services, 25 (12.7%) technical services, 30 (15.3%) curatorial, 17 (8.6%) mixed, 3 (1.5%) administration-public services, 15 (7.6%) administration-technical services, 11 (5.6%) administration-curatorial, and 19 (9.6%) other. Overall, across all three previous positions, the number of people holding administrative positions of some type is the largest (45%), followed by positions with at least some curatorial responsibilities (20.9%) and then at least some technical services (20.3%).

Of the IRLA institutions for which the authors could identify a position holder (14), they were able to identify a most recent previous position type for 13 (92.9%). Of those identified, 7 (53.8%) were administrative, 2 (15.4%) curatorial, 1 (7.7%) mixed, and 3 (23.1%) other. Previous positions in administration are by far the most common for IRLA administrators, followed by other and then curatorial. The authors also aggregated data for the three most recent positions held by IRLA directors.<sup>37</sup> Of the total IRLA position types for all three previous positions collected, 14 (45.2%) were administrative, 1 (3.2%) technical services, 4 (12.9%) curatorial, 1 (3.2%) mixed, 1 (3.2%) administration-public services, 2 (6.5%) administration-technical services, and 8 (25.8%) other. Once again across all three previous positions, the number of people previously holding administrative positions of some type is the largest (54.9%). However, in this part of the dataset, other (25.8%) is the second most prevalent type. This may correlate with the large number of PhD-holding directors at IRLA institutions, as many came from faculty or faculty-administrative backgrounds rather than directly through libraries.

Of the Oberlin Group institutions for which the authors could identify a position holder (39), they were able to identify a most recent previous position type for 31 (79.5%). Of those identified, 7 (22.6%) were administrative, 2 (6.5%) public services, 4 (12.9%) technical services,

7 (22.6%) curatorial, 4 (12.9%) mixed, 1 (3.2%) administration-public services, 5 (16.1%) administration-technical services, and 1 (3.2%) other. Following administrative roles, both kinds of technical services positions make up 29% of the total, curatorial positions make up 22.6%, and both kinds of public services positions make up just 9.7%. The authors also aggregated data for the three most recent positions held by Oberlin Group directors.<sup>38</sup> Of the total Oberlin Group position types for all three previous positions collected, 14 (21.5%) were administrative, 4 (6.2%) public services, 12 (18.5%) technical services, 9 (13.8%) curatorial, 11 (16.9%) mixed, 2 (3%) administration-public services, 10 (15.4%) administration-technical services, and 3 (4.6%) other. Once again across all three previous positions, the number of people previously holding administrative positions of some type is the largest (39.9%). The other major categories were jobs with technical services components (33.9%), curatorial components (13.8%), and public services (9.2%). Curatorial and technical services roles are the most common after administrative positions; however, unlike in ARL and IRLA libraries, technical services positions are more common than curatorial positions (see table 3).

**TABLE 3**  
**Previous Professional Background\***

	ARL		IRLA		Oberlin	
	#	%	#	%	#	%
Administrative	60	31%	14	45%	14	22%
Public services	16	8%	0	0%	4	6%
Technical services	25	13%	1	3%	12	19%
Curatorial	30	15%	4	13%	9	14%
Mixed	17	9%	1	3%	11	17%
Administration — public services	3	2%	1	3%	2	3%
Administration — technical services	15	8%	2	7%	10	15%
Administration — curatorial	11	6%	0	0%	0	0%
Other	19	10%	8	26%	3	5%

\*Percentages have been rounded up to the nearest whole percentage.

Across all three types of institutions, the percentage of administrative jobs was lower in the aggregate data than in the most immediate previous position data. This is not surprising, as newer special collections administrators are less likely to hold administrative positions as they go farther back in their careers. Aside from other administrative roles, curatorial and technical services backgrounds are the most common for special collections administrators.

There may be several reasons for the lack of representation of experience in public services positions among special collections administrators.<sup>39</sup> Some of the positions in this subfield, such as primary source instruction and assessment, are still relatively new to the special collections field (within the last ten to fifteen years), and thus many administrators may have moved into leadership positions before these aspects of the profession became more prominent and respected. In many special collections, public services positions include large commitments to working with researchers in the reading room, including time on the reading room desk. Such responsibilities may make it harder for those holding public services positions to attend professional development opportunities, conferences, trainings, and networking events that

develop networks and skills that would allow them to move into higher administrative roles. Studies have also found that despite increased use of materials and requests for access, jobs in public services are often at risk for cuts,<sup>40</sup> and public services librarians have identified “needs more staff” as the top issue which prevents them from successfully completing daily work.<sup>41</sup>

### ***Gender and Previous Professional Background***

Of the 57 women in the ARL dataset with at least one previously identified position, the authors were also able to identify a second most recent position for 48 and third most recent for 34. When aggregated, 43 (30.9%) were administrative, 11 (7.9%) public services, 18 (12.9%) technical services, 20 (14.4%) curatorial, 15 (10.7%) mixed, 3 (2.1%) administration-public services, 10 (7.2%) administration-technical services, 7 (5%) administration-curatorial, and 12 (8.6%) other.

Of the 25 men in the ARL dataset with at least one previously identified position, the authors were also able to identify a second most recent position for 20 and third most recent for 12. When aggregated, 17 (29.8%) were administrative, 5 (8.8%) public services, 7 (12.3%) technical services, 10 (17.5%) curatorial, 2 (3.5%) mixed, 5 (8.8%) administration-technical services, 4 (7%) administration-curatorial, and 7 (12.3%) other (see table 4).

Of the 2 women in the IRLA dataset with at least one previously identified position, the authors were also able to identify a second most recent position for both and third most recent for 1. When aggregated, 1 (20%) was administrative, 2 (40%) mixed, 1 (20%) administration-technical services, and 1 (20%) other.

Of the 11 men in the IRLA dataset with at least one previously identified position, the authors were also able to identify a second most recent position for 8 and third most recent for 7. When aggregated, 13 (50%) were administrative, 1 (3.8%) technical services, 4 (15.4%) curatorial, 1 (3.8%)

**TABLE 4**  
**ARL: Gender and Previous Professional Background\***

	<b>Women</b>		<b>Men</b>	
	#	%	#	%
Administrative	43	31%	17	30%
Public services	11	8%	5	9%
Technical services	18	13%	7	12%
Curatorial	20	14%	10	18%
Mixed	15	11%	2	4%
Administration — public services	3	2%	0	0%
Administration — technical services	10	7%	5	9%
Administration — curatorial	7	5%	4	7%
Other	12	9%	7	12%

\*Percentages have been rounded up to the nearest whole percentage.

**TABLE 5**  
**IRLA: Gender and Previous Professional Background\***

	<b>Women</b>		<b>Men</b>	
	#	%	#	%
Administrative	1	20%	13	50%
Public services	0	0%	0	0%
Technical services	0	0%	1	4%
Curatorial	0	0%	0	0%
Mixed	2	40%	0	0%
Administration — public services	0	0%	1	4%
Administration — technical services	1	20%	1	4%
Administration — curatorial	0	0%	0	0%
Other	1	20%	6	23%

\*Percentages have been rounded up to the nearest whole percentage.

administration-public services, 1 (3.8%) administration-technical services, and 6 (23.1%) other (see table 5).

Of the 18 women in the Oberlin Group dataset with at least one previously identified position, the authors were also able to identify a second most recent position for 13 and third most recent for 8. When aggregated, 6 (15.4%) were administrative, 2 (5.1%) public services, 9 (23.1%) technical services, 2 (5.1%) curatorial, 7 (17.9%) mixed, 1 (2.5%) administration-public services, 10 (25.6%) administration-technical services, and 2 (5.1%) other.

Of the 13 men in the Oberlin Group dataset with at least one previously identified position, the authors were also able to identify a second most recent position for 9 and third most recent for 4. When aggregated, 8 (30.8%) were administrative, 2 (7.7%) public services, 3 (11.5%) technical services, 7 (26.9%) curatorial, 4 (15.4%) mixed, 1 (3.8%) administration-public services, and 1 (3.8%) other (see table 6).

The trends seen in the aggregate data without gender breakdowns mostly hold for this analysis. Across gender backgrounds, previous administrative jobs remain important for higher administrative positions. Curatorial and technical services backgrounds also remain important for both men and women. Of note is the fact that despite few administrators possessing backgrounds in public services, men are overrepresented; the data from ARL indicates an almost equal number of men and women with positions containing at least some public services component, while IRLA and Oberlin Group data show more men than women with public services backgrounds. If gendered expectations of leadership value “masculine” qualities such as ambition, dominance, and action,<sup>42</sup> while public services roles are often stereotyped as “helper” (and therefore feminized) roles, there may be a perception that the personalities and traits that make a good public services librarian do not make a good special collections leader, but that this can be overcome when someone identifying as male is in the position. Future work on this topic should further explore these questions and their implications.

### *Internal Promotions and Cross-Institutional Type Movement*

While educational background and work experience are obviously important for a candidate’s success in a position, the authors also wondered how a person’s immediately previous place of employment may impact their administrative prospects, from internal promotion to possible institutional type bias.

Of the 82 administrators at ARL institutions where the authors had identified their previous positions, 35 (42.7% of the dataset) were most recently employed at the same institution, 24 (68.6%) women and 11 (31.4%) men. Of the 14 IRLA administrators, only one (7.1%

**TABLE 6**  
**Oberlin Group: Gender and Previous Professional Background\***

	<b>Women</b>		<b>Men</b>	
	#	%	#	%
Administrative	6	15%	8	31%
Public services	2	5%	2	8%
Technical services	9	23%	3	12%
Curatorial	2	5%	7	27%
Mixed	7	18%	4	15%
Administration — public services	1	3%	1	4%
Administration — technical services	10	26%	0	0%
Administration — curatorial	0	0%	0	0%
Other	2	5%	1	4%

\*Percentages have been rounded up to the nearest whole percentage.

of the dataset) fit this category, a woman. Of the 32 Oberlin administrators, 12 (37.5% of the dataset) fit this category, 7 (58.3%) women and 5 (41.7%) men. Combined, previous positions were identified for 128 administrators (81% of the total dataset gathered). Of those position holders, 48 (37.5%) were immediately previously employed at the same institution. These findings seem to be in direct conflict with the general wisdom that if one wishes to gain a leadership position, advance administratively, or receive a significant raise, one must be willing to change employers. This finding is particularly important for the special collections field because so much institutional memory and knowledge is held by those working at an institution. Opportunities for internal advancement are key to keeping that knowledge and memory at the institution. It is further significant because women are twice as likely as men to note that geographic location is a factor in accepting a position.<sup>43</sup> It is also worthwhile to note that two studies of women's paths to library leadership found that women were more likely to become library leaders as internal candidates, while men were more likely to be hired from the outside.<sup>44</sup> Thus, allowing more opportunities for internal promotion could lead to more leadership opportunities for women.

Given that the dataset included many flagship research institutions, independent libraries outside traditional academia, and small liberal arts colleges without graduate students, the authors sought to determine whether it was possible for administrators to move among different types of institutions. When the authors examined the dataset for administrators with immediately previous positions at institutions from different groups, there were very few examples of going from a smaller institution type to a larger one. Only one ARL administrator immediately came from an Oberlin Group institution. Six IRLA administrators had moved from one institutional group to another, though two of these were academic faculty members and only one came to their IRLA institution from an Oberlin Group institution. However, there were more examples of going from large institution types to smaller ones. Eleven Oberlin Group administrators had last worked at an ARL institution, which is 34.4% of Oberlin administrators with previous positions identified. This data may indicate a higher perceived value for work experience from ARL institutions, and may also indicate a reluctance in ARL hiring practices to consider those without experience working with graduate students or supervising large numbers of staff.<sup>45</sup>

## Suggestions for Future Research

This study provides a snapshot of current special collections administrators in different types of institutions in the United States; however, there remain many questions and avenues of study. The field could learn more over time through replicating this study over a period of years to determine if these findings change or if they still hold true when a new generation of administrators is hired or promoted. The data and conclusions in this article might also be used to compare American institutions to international ones.

Given that the authors identified far fewer administrators with known backgrounds in public services, further study on why this is so. Given the increase in attention to some aspects of public services, such as instruction, in the past ten years, will this have an effect on future paths to leadership? Will the attitude toward public services special collections librarians as handmaidens<sup>46</sup> affect these workers' ability to gain leadership positions? Questions could also be asked about prestige, and how different subfields of special collections such as curatorship, public services, and technical services are viewed in terms of prestige, specialized versus

general knowledge, and potential for growth. Future studies could also survey special collections administrators to learn what responsibilities from their previous positions prepared them for administrative and leadership roles, and whether this correlates to specific types of positions within the profession, as well as their age and length of career before moving into special collections administration.

Future studies might also examine the effects of the large number of unemployed, under-employed, contingent, and grant-funded workers on paths to special collections leadership. Questions might be asked about whether those in contingent and grant-funded positions can gain the skills needed to advance, whether the large number of people looking for work in the special collections field has led institutions to require more or higher degrees at all levels as a way to narrow down large application pools, and how the covid-19 pandemic has affected the pipeline for special collections administrators. Such studies might also examine whether there have been changes in the educational backgrounds of special collections administrators, and how those might be different along the gender spectrum.

Future research should also explore how the profession can collectively make paths to special collections leadership more equitable. An examination of racial diversity in special collections administration would help uncover just how far the field must go to better represent all users of special collections. Such a study could also contribute to the discourse around retaining and promoting Black, Indigenous, and People of Color (BIPOC) practitioners. Surveying BIPOC special collections practitioners with an interest in leadership could illuminate the pathways and obstacles that may differ from their white colleagues.

## Conclusion

This study has shown that special collections administrators come from a variety of professional backgrounds and hold different types of degrees. While women outnumber men, men are overrepresented based on their numbers in the profession. The combination of the MLIS and MA is the most common degree grouping for special collections administrators. Men are more likely to hold PhDs than women. Previous administrative experience is important to gaining a director position, but curatorial and technical services backgrounds are also common for special collections administrators.

There is still much to be learned about pathways to special collections administration and how those aspiring to such positions might position themselves. The authors hope that future research will illuminate some of the questions raised by this study.

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32. The authors did not use personal knowledge when filling in this data, as they want this study to be replicable in the future.
33. All degrees were considered comprehensively. For instance, MLS, MIS, and other degrees from library science programs were grouped under "MLIS," while an MS would have been grouped with the "MA" category, and any doctoral degree beyond the PhD would have been categorized there.
34. Harvard University, Indiana University Bloomington, Ohio State University, Temple University, University of Iowa, University of Miami, University of Notre Dame, Virginia Commonwealth University, Yale University
35. Oberlin College
36. For the second most recent job, the authors were able to identify position types for 68 (64.7%) position holders. The authors were able to locate data on a third most-recent position for 46 (43.8%) position holders.
37. For the second most recent job, the authors were able to identify position types for 10 (71.4%) position holders. The authors were able to locate data on a third most-recent position for 8 (61.5%) position holders.
38. For the second most recent job, the authors were able to identify position types for 22 (56.4%) position holders. The authors were able to locate data on a third most-recent position for 12 (30.8%) position holders.
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# Exploring the Evolution and Characteristics of the iSchool Movement in China

Mingkun Wei, Ismael Mostafavi, Russell Savage, Changyang Feng, and Shima Moradi

This study examines the evolution of current interests and emerging characteristics in library and information science (LIS) from Chinese iSchools, including an analysis of the LIS landscape, space distribution, citation, emerging characteristics, and collaborations. This study considers a non-parametric approach to outline the structure of the iSchool movement in China, while clustering analysis helped us obtain information about the descriptions generated within unsupervised learning groups. It was found that Chinese iSchools play an intermediary role in the international development of Chinese LIS, which further promotes the dissemination and exchange of knowledge and international cooperation in LIS.

## Introduction

Information Schools (iSchools) are emerging as one of the most exciting fields in academia, especially with respect to information and computing programs.<sup>1</sup> With rapid development of information technology, the demand for information talents is at the forefront of severe challenges to the field of LIS.<sup>2,3</sup> In response to the challenge, some of the leading LIS institutions in the USA have launched the information school movement and established a new form of school named iSchools, aimed at guiding the development of LIS into an interdisciplinary domain.<sup>4</sup> ISchools were founded in 2005 by a group of information schools dedicated to advancing LIS in the twenty-first century (<https://ischools.org/About>). The abovementioned academic model was developed over years to prepare graduates for the information-driven world. The model progressed from “library” to “Library and Information science” in the United States during the 1970s.<sup>5</sup> The letter *i* in iSchools refers to information or interdisciplinarity, demonstrating the importance of both concepts in the job market as well as the overall recent trends within the field,<sup>6</sup> the impact of which has been expanding with the rapidly growing popularity of iSchools. These schools are designed to prepare the expert in providing any type of information services needed to boost science, business, education, and culture.<sup>7</sup>

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iSchools are governed by iCaucus (the group of Deans), which addresses the relationship between information, technology, and people. This is required for progress to be made in science, business, education, and culture.<sup>8</sup> Discipline integration is a major topic of iSchools research, so much so that James Thomas, the dean of the school of Science and Technology at Pennsylvania State University, assumed that the “i” in iSchools was an abbreviation for interdisciplinary.<sup>9</sup> The iSchools movement advocates the reform of library and information science, which needs to be repositioned and support training while also carrying out reforms and innovation in the curriculum system, faculty construction, and in teaching and scientific research interaction.<sup>10</sup> In order to develop LIS, it must be integrated within the contemporary information environment and cultivate professional talents.<sup>11</sup> The rapid development of iSchools has attracted the attention of various Chinese schools of LIS, among them nine of the highest rated Chinese universities in the country. These schools have joined the iSchools union since its founding,<sup>12,13</sup> including Central China Normal University, Jilin University, Nanjing University, Nanjing University of Science and Technology, Peking University, Renmin University of China, Shanghai University, Sun Yat-sen University, and Wuhan University. However, the status of these universities and the prospects for further development of the field in China are not clear. The objective of this study is to find out the role of iSchools in the development of Chinese LIS by seeking to identify the landscape, emerging trends, and collaboration of LIS in Chinese iSchools.

## **Literature Review**

The ecosystem of information within LIS is dynamic and controversial, and has led to rapid changes.<sup>14</sup> The notion of iSchools was conceived of as far back as 1988, when it was claimed that information science could integrate nature and society.<sup>15</sup> Browsing the literature in this field showed that many studies have taken iSchools into account. A number of studies have analysed various attributes of iSchools, such as intellectual coverage, interdisciplinarity, and research commitment.<sup>16</sup> Wiggins and Sawyer studied the intellectual distribution and faculty composition of academic units involved in the iSchool’s community to better understand its intellectual heritage.<sup>17</sup> They pointed out the interdisciplinary diversity mostly among computing, library, and information sciences. A description of the intellectual landscape of iSchools and investigation of its evolution by Ping Zhang, Jasy Liew Suet Yan, et al. revealed the interdisciplinary nature and multiple dominant themes in iSchools.<sup>18</sup> Moreover, Li Si, Xiaozhe Zhang, et al.’s study of the role and value of iSchools provides some indications of LIS education of scientific data specialists in China.<sup>19</sup> Considering the iSchool structure, Ana Ndumu discussed librarianship as a career option remaining largely out of sight or out of reach for many African Americans.<sup>20</sup> The libraries have changed and covered a broader scope of LIS under the development of iSchools.<sup>21</sup> However, Nathan et al. used social networking tools to explore the differences between iSchools and LIS schools, observing that iSchools are uniquely to design proactive and adaptive policies for social media.<sup>22</sup>

As for the capacity of iSchools, Mulder and van Weert focused on informatics curriculums designed to cope with the high diversity demand for informatics education in a controlled way.<sup>23</sup> Moran and Marchionni posit the enhancement of educational pathways and of information specialists and graduates as the reasons for the projected transformation in iSchools by 2050.<sup>24</sup> Furthermore, Angel Krystina Washington Durr study of job postings and iSchool

course documentation exploring the intersection of LIS and data science<sup>25</sup> demonstrated the techniques related to data science in these schools. This approach has been of interest in other studies: J. Ding, J. Chen, et al. proposed the adoption of research activities, programs, and curriculum that would meet society's need to train student;<sup>26</sup> Sam Oh, Song I Y., et al. identified the characteristics of data science education and investigated whether current curricula meet the needs of data science education.<sup>27</sup>

Addressing the pros and cons of the iSchool movement, Hildreth, Charles R., and Michael Koenig investigated a merging of LIS schools with neighbouring informatics and computing schools in the overall development of LIS schools.<sup>28</sup> Sperry DE, Miller PJ, et al. estimated that the achievement of the vision of iSchools was beyond the scope of one single discipline and required interdisciplinary work.<sup>29</sup> Their study suggested that iSchool collaboration should be pursued nationally or globally through curricular programs, community outreach, and partnerships with other non-profit and for-profit institutions and organizations. Christopher Cyr and Lynn Silipigni Connaway investigated information and sustainability undertaken at iSchools as well as computer and human-computer interaction (known as HCI) communities by thematic analysis of UN policy documents.<sup>30</sup> They found that iSchools have the potential to promote a culture of sustainable information practices essential to prepare society to achieve the UN's sustainable development goals. In contrast, some studies have addressed the side effects of this movement, such as dividing LIS community and isolating small LIS schools.<sup>31</sup> The aforementioned research has been either limited to theoretical discussions or focused on the characteristics or development of iSchools, and most of it has emphasized multidisciplinary and disciplinary data diversity and argued the undeniable connection between information and computer science. However, this research concentrates on the current landscape of *Chinese* iSchools and their emerging trends, an underresearched area.

## Data and Methodology

To conduct this research comprehensively, the data were retrieved from multiple databases including the China National Knowledge Infrastructure (CNKI) and Web of Science (WoS) Core Collection\* on March 31, 2022. WoS is the most comprehensive gateway of knowledge in China; the following publications were retrieved in support of the search strategy:

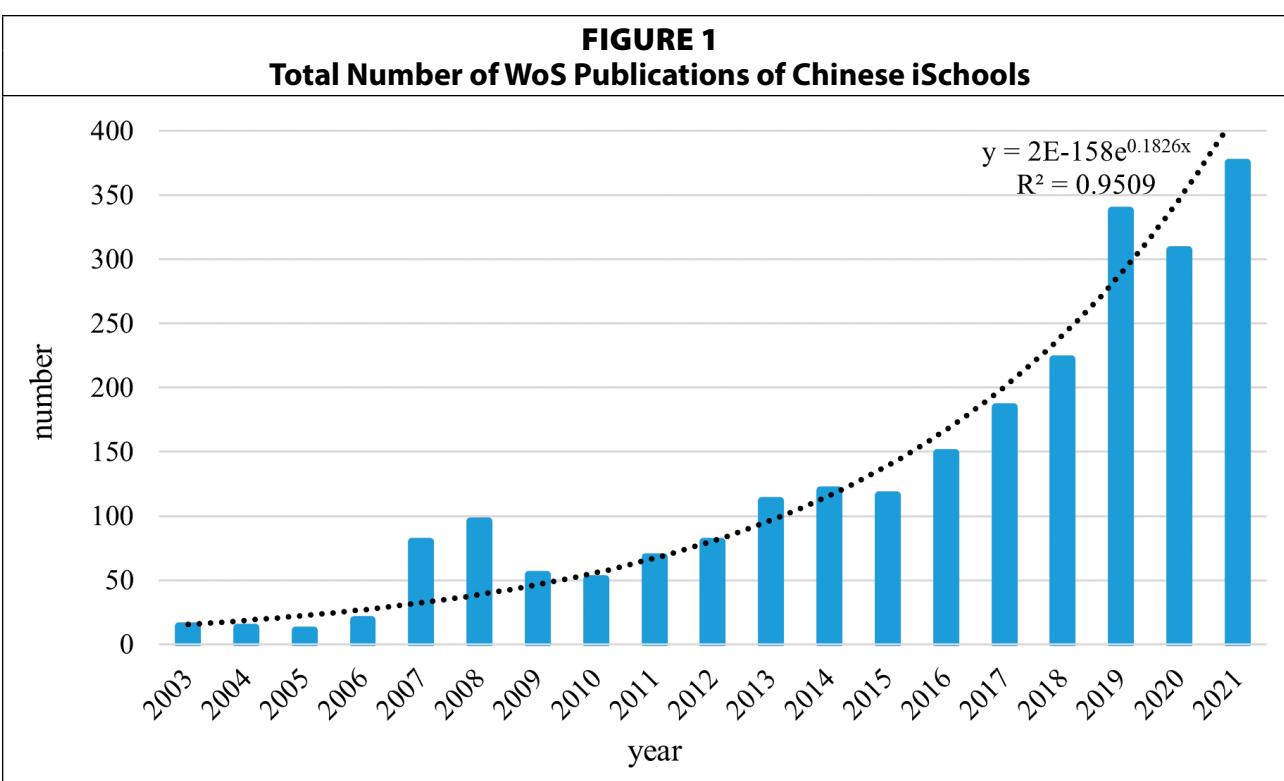
*WoS is OO= ((Central China Normal University) OR (Jilin University) OR (Nanjing University) OR (Nanjing University of Science and Technology) OR (Peking University) OR (Renmin University of China) OR (Shanghai University) OR (Sun Yat-sen University) OR (Wuhan University)) AND SU=Information Science & Library Science.*

The dataset demonstrated that 2,588 publications in WoS have been published since 2003, as shown in figure 1, indicating that the first publications for databases appeared in 2003. The figure displays the rapid increase in the number of documents since 2003 over the last eighteen years. The value of the exponential growth fitting curve was 0.9509, which indicated a high degree of fit. To an extent the data reflects increasing internationalization in the achievements of Chinese LIS.

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\* Core Collection includes all document types in Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index.

**FIGURE 1**  
**Total Number of WoS Publications of Chinese iSchools**



The first publication indexed in LIS appeared in 2007. This database was launched in 1996 by Tsinghua University and Tsinghua Holding Group, and was dedicated to the mass digitalization of China's knowledge resources, as well as creating a platform for global dissemination and value-added services. CNKI has developed the most comprehensive system of China's academic knowledge resources, over 90 percent of which it collects, including journals, dissertations, newspapers, proceedings, yearbooks, reference works, encyclopedias, laws, and regulations.

This research was conducted using Scientometrics as the quantitative study of science, focusing on scholarly publication and citation data and providing insight into their value and impact. As for tools, CiteSpace and analytic hierarchy processed by SPSS (Statistical Product Service Solutions) were employed. The top fifty cited references per time slot were selected to visualize the document in co-citation network in both cluster analysis and co-occurrence analysis using CiteSpace, which generates and analyzes networks of co-cited references based on literature records.<sup>32,33</sup> The nature of the co-citation network can be identified by algorithmically generated labels of the cluster and representative concepts in the cluster. The analytic hierarchy process (AHP) is essentially the formalization of our intuitive understanding of a complex problem by breaking it down into a hierarchical system. Moreover, AHP is a decision-making method for qualitative and quantitative analysis, which is different from using text mining functionality to construct and visualize co-occurrence networks from important terms in scientific literature.<sup>34</sup> After completed the analytic hierarchy process of LIS keywords, the correlated classification of clusters of LIS subjects can be finally obtained.

## Results and Discussion

ISchools play an important role in promoting, developing and improving the Chinese system for constructing LIS,<sup>35</sup> which guides the cultivation of outstanding scientific talents in

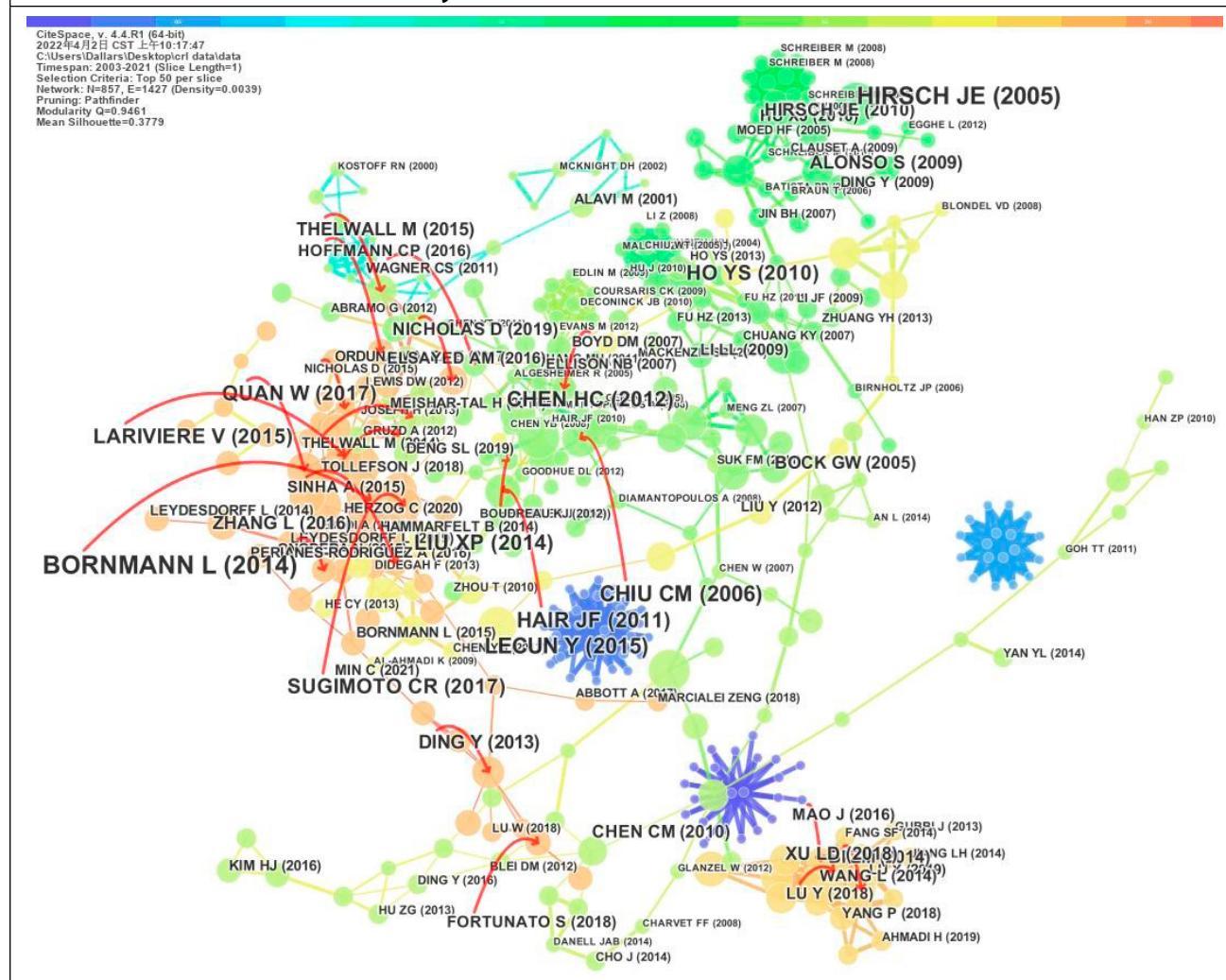
LIS research. This paper employs bibliographic records for exploring the landscape of LIS in Chinese iSchools and detecting the current interest them.

### Landscape of Chinese iSchools

The landscape of LIS was represented by a network of cited references, as shown in figure 2. The linking of the network between two nodes represents how frequently two articles are cited together by other articles in a dataset. The blue indicates the earliest connections, with orange showing the most recent connections. The red nodes reflect citation bursts; the purple rims of nodes indicate pivotal points with high betweenness centrality. The quality of the whole division is measured by the modularity ( $Q$ ), which ranges from 0 to 1. The low value of modularity indicates a network that cannot be reduced to a cluster with clear boundaries; if the value approaches 1, a well-structured network is inferred.

The modularity ( $Q$ ) was equal to 0.9496 and the mean silhouette was 0.4937, which indicated a good intercluster connection network from a considerable partition of the network. The clusters revealed the specific problems and subfields involved in LIS. The top  $N$  indicates that  $N$  documents with the highest citations are extracted from each time slice; the larger  $N$  is, the more comprehensive the network will be. According to the threshold requirements,<sup>36</sup>

**FIGURE 2**  
Co-citation Analysis of LIS Publications for Chinese iSchools



the threshold was set to top fifty per year, which generated a co-citation cluster network of LIS for Chinese iSchools. As previously described,<sup>37</sup> the findings displayed diversity together with 760 nodes and 623 links, each node standing for a cited literature and the size of nodes representing the number and the importance of the cited literature. The landscape of thematic trends was based on the CiteSpace of burst detection.<sup>38</sup> Citation bursts of the literature indicate that highly cited literature provides concrete indicators of emerging themes as well as authors that have been influential. The high-burst cited references were chosen from the document co-citation network to highlight the salient themes and contributors of LIS in Chinese iSchools.

CiteSpace allows researchers to detect burst literature with red. Citation bursts may indicate the degree of attention from the scientific community to a published article. Burst detection can also identify burst literatures as indicators of emerging trends.<sup>39</sup> These burst literatures reflect the focus of LIS for Chinese iSchools and predict future trends. According to figure 2, burst literatures include a burst value that reflects the different impact in the development of iSchools. These burst literatures indicate the research hotspots to a better answer to society in line with Andrew Dillon<sup>40</sup> and Moran B. and Marchionini G.<sup>41</sup> This claim is reaffirmed when such a finding is observed in the time cluster analysis, namely, the analysis of cited references from the time line view. It was found that the quality of scientific research output has become the theme of research in LIS. Moreover, highly cited and influential research references in a specific research domain can be found through document co-citation analysis,<sup>42</sup> particularly in detection of important literature. The frequency of cited references shown in Table 1 could reflect the classicality and importance of references in LIS, which become the knowledge base of this field. The highest burst value was 8.65, which was cited nineteen times. The cited literature published by Hirsch JE had a high impact on the development of LIS in Chinese iSchools.<sup>43</sup> The second most highly cited literature

**TABLE 1**  
**The Top 10 Cited Literatures in Co-citation Frequency Related to LIS**

Frequency	Burst Value	Author	Cited Reference
19	8.65	Hirsch, JE	An index to quantify an individual's scientific research output
18	6.57	Liang, HG	Understanding and mitigating uncertainty in online exchange relationships: A principal-agent perspective
13	5.89	Chiu, CM	Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories
14	5.63	Liu, Y	Social sensing: A new approach to understanding our socioeconomic environments
13	5.59	Chiu, WT	Bibliometric analysis of tsunami research
10	5.47	Kankanhalli, A	Contributing knowledge to electronic knowledge repositories: An empirical investigation.
9	4.63	Ross, L	The library is dead, long live the library! The practice of academic librarianship and the digital revolution
10	4.4	Arms, WY	The 1990s: the formative years of digital libraries
13	4.25	Chen, HC	Business intelligence and analytics: From big data to big impact.
8	4.19	Pei, T	A new insight into land use classification based on aggregated mobile phone data

was published by Liang HG with 18 citations. These most cited references, to some extent, were regarded as the knowledge base of LIS, which would promote future research. It is worth mentioning that the most highly cited references address digitization, which reflects the tangible and intangible changes in academia to continue technological improvements.

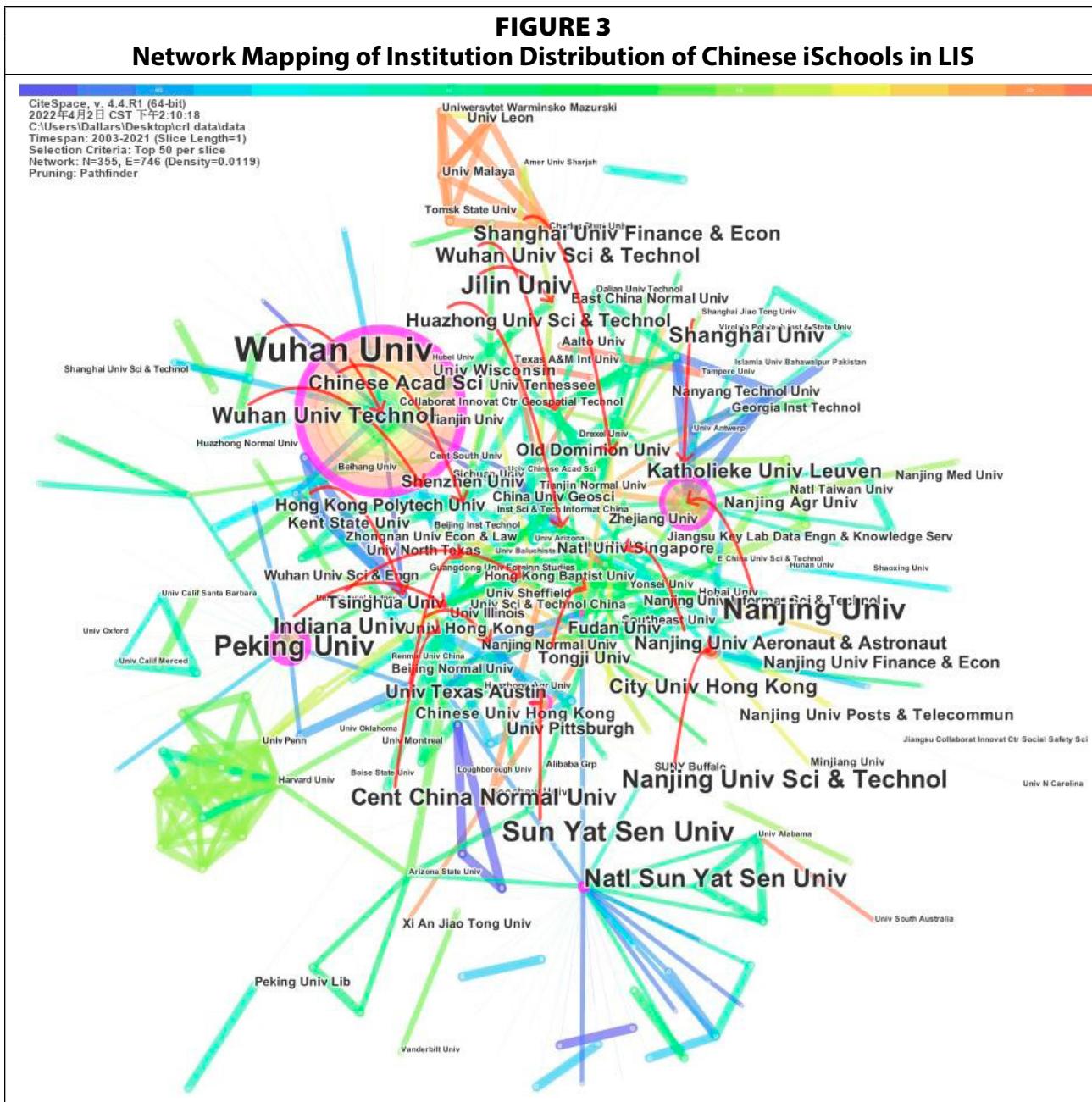
There is extensive literature about trend analysis using CiteSpace,<sup>44, 45</sup> highlighting the developing nature of LIS.<sup>46</sup> However, little research has been done regarding the hot topics of iSchools using bibliometric methods. In this paper, LIS literature was analysed using CiteSpace to discover the main trends and current topics of Chinese iSchools. The high-burst cited references among document co-citation networks were traced to highlight the salient themes and contributors of the iSchools research field and domains. The perspective of iSchools, along with the clustering analysis, was also identified.

### *Space Distribution of Collaboration for Chinese iSchools*

The co-country analysis was carried out to clarify the distribution of countries involved in LIS for Chinese iSchools. It was found that the USA, Taiwan, England, Australia, Singapore, and Pakistan played key roles in the collaboration of LIS in Chinese iSchools. China's cooperation in LIS is expanding from the degree of cooperation already given. Figure 3 shows that countries acted as the node type, with the size of the node reflecting the frequency of cooperation between China and other countries. With the development of iSchools, the cooperating countries changed from 2003 to 2021; in recent years, the collaboration with Malaysia, Poland, Denmark, and Scotland increased gradually.

In constitution analysis, the institution acted as the node type, and the cooperation network among institutions involved thirty-six nodes and thirty-seven links after 3.502s, as shown in figure 3. The centrality of an institution reflected its role in cooperation, as well as its weight in Chinese iSchools. The highest centrality was observed in Wuhan University, followed by Peking University with centrality of 0.55 and 0.49 respectively. From the analysis of cooperation frequency, the highest institution was Wuhan University, followed by Nanjing University with respective frequency of 1205 and 384. Science expands along with communication and scholarly communication is hence of high importance, as it can be used to interpret the network mapping of aforementioned iSchools, which generally is associated with the exchange of experience and knowledge, as supported in research conducted by Nathan, Lisa P., Alice MacGougan et al.<sup>47</sup>

Table 2 lists the top five co-institutions in terms of frequency and centrality, with most co-institutions being domestic institutions in China. From the analysis of co-institution distribution, the cooperation between domestic institutions such as Wuhan University, Nanjing University, and Peking University was not balanced. The cooperation between these universities was fairly close given that they were important partners and members of iSchools, which demonstrates that this cooperation between iSchools members is associated with obvious advantages. However, the cooperation with other international iSchools members was still negligible. Gobinda Chowdhury and Kushwanth Koya referred to the proximity of LIS and computer science, arguing that cooperation and collaboration among iSchools can promote a culture of sustainable information practices among university graduates and researchers in different disciplines, which will pave the way for achieving seventeen Sustainable Development Goals (SDGs). Therefore, the weak connection can be interpreted as a lack of strong communication or differences in curriculum content.



**TABLE 2**  
**The Top 5 Co-institution Distribution in the LIS**

NO.	Frequency	Institution	Centrality	Institution
1	1205	Wuhan Uni	0.55	Wuhan Uni
2	384	Nanjing Uni	0.49	Peking Uni
3	324	Peking Uni	0.37	Natl Sun Yat Sen Uni
4	263	Sun Yat Sen Uni	0.24	Nanjing Uni
5	161	Nanjing Uni Sci & Tech	0.16	Sun Yat Sen Uni

### *Co-occurrence Analysis of Research Interest from the Viewpoint of Chinese iSchools*

The keyword is the extraction of a document that automates the extraction of representative and characteristic words from a document that expresses all the key aspects of its content.<sup>48</sup> Table 3 shows the facet of iSchools research in China, highlighting the top twenty keywords with the highest occurrence, such as impact, model, information, and science, in iSchool publications. These keywords help indicate significant themes in the current interest in the development of Chinese iSchools. In relation to these top twenty keywords, further analysis was done by dividing keywords into groups, including information, technology, and human being; discipline integration, teaching system, and curriculum; scientific research and cooperation communication; and the development of LIS. There was an overlap within these groups, which indicated the close association among research groups. Through further analysis of these groups of high-frequency keywords, LIS research could be indicated in the discussion on the concept of discipline integration, curriculum design, scientific research, and reform of LIS education. These categories demonstrated the transformation mentioned by M. Brunet,<sup>49</sup> as well as the multidisciplinary nature of LIS context, as previously referred to by L. Lyon and A. Brenner,<sup>50</sup> and by F. Mulder and T.J.V. Weert.<sup>51</sup>

The development of iSchools engaged in various research content is the foundation for an emerging research field.<sup>52</sup> The history of the i-movement has been associated with attempts by some previous programs to distinguish themselves from the traditional library programs. There is a large degree of variability in the levels of interdisciplinarity, the structure of academic units, and faculty composition in the iCaucus movement.<sup>53</sup> Moreover, one of the research goals of iSchools is to discover multidisciplinary areas and promote cross-domain integration and cooperation,<sup>54</sup> which meets the development needs of talents, exploring the role of information in human activities where information, technology, and human relations are the focus for research and practice. Human-computer interaction (HCI) has been referred to as one of the most crucial topics to be included in LIS curriculum.<sup>55</sup> Course content of this scientific field is rooted in the multifaceted attention of iSchools' students and scholars to topics including information, technology, networking, and collaboration, as well as public aspects leading to a variety of keywords in research.

**TABLE 3**  
**The Top 20 Keywords in the Field of LIS**

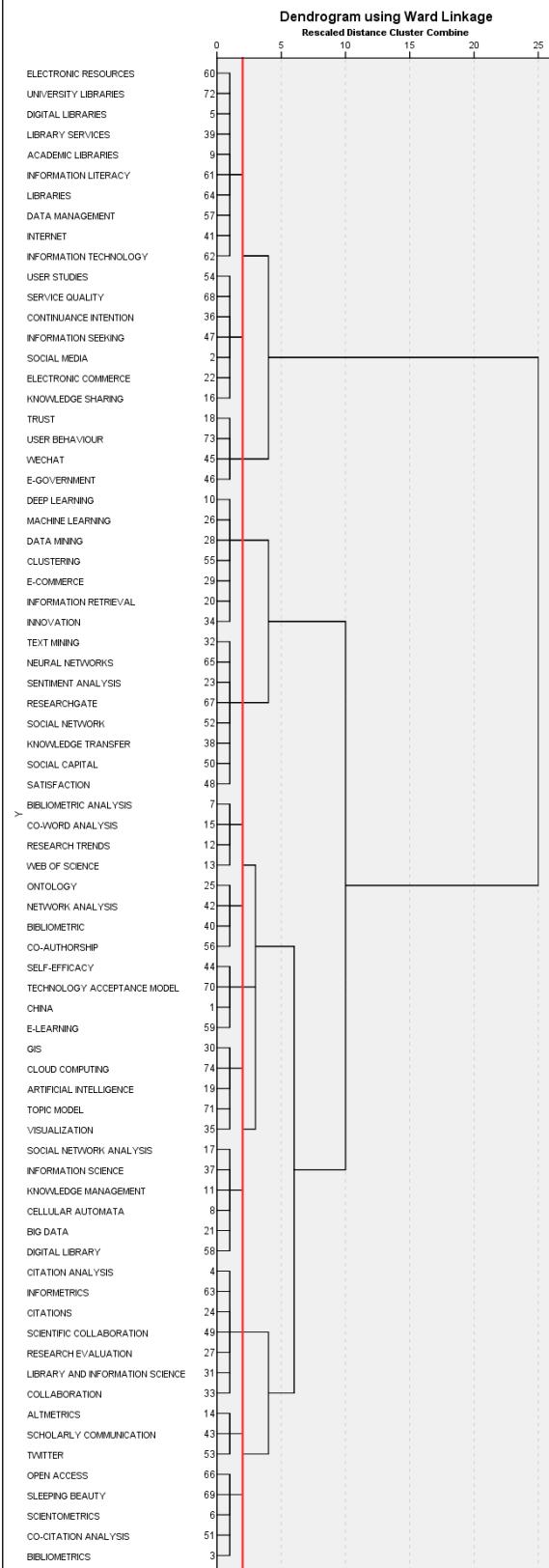
No.	Keywords	Frequency	No.	Keywords	Frequency
1	impact	238	11	citation	87
2	model	219	12	knowledge	82
3	information	148	13	pattern	80
4	science	140	14	web	80
5	system	131	15	quality	73
6	behaviour	120	16	management	72
7	network	115	17	collaboration	66
8	performance	115	18	trust	63
9	technology	114	19	adoption	59
10	social media	105	20	information technology	53

## *Identifying Different Concepts of iSchools from Hierarchical Cluster Analysis*

Hierarchical cluster analysis can identify groups of samples that behave similarly or show similar characteristics, and thus quantify the structural characteristics of the samples or variables. The procedure of the hierarchical clustering involves the construction of a tiered, treelike structure. There are two kinds of procedures used to produce a structure, namely agglomerative and divisive. In the agglomerative method, each observation starts in a cluster of its own and then continuously joins clusters together until there is only one cluster consisting of all the observations. The divisive method proceeds in the opposite direction to the agglomerative method. The main objective of hierarchical cluster analysis of sample data is to classify the data into different groups by structuring it. This would then help in identifying the relationship among observations. LIS and related research have been a hot topic both at home and abroad; LIS is interdisciplinary due to the advanced nature and creativity of the discipline.<sup>56</sup> The rapid development of information technology and the continuous progress of emerging disciplines are injecting more vitality into the field, together with new tools and methods.<sup>57</sup> After the integration of library science and information science, several scholarly studies in the field are still based on specific content and form a theoretical and practical system. At the iConference in 2019, scholars from around the world gathered at the University of Maryland to talk about the education for the information professions, domain-centric and cross-disciplinary educational opportunities in iSchools, and other matters. The meeting consisted of a focused discussion on education for the information professions to identify areas of common challenges and issues, and to generate ideas and creative approaches to teaching and learning in the information fields.<sup>58</sup>

The keyword is the core and essence of literature, which is a high-level summary of the content of literature. Clustering of keywords of

**FIGURE 4**  
**The Hierarchical Clustering of LIS Studies Interest of iSchools in China**



Chinese iSchools studies in LIS can be seen in figure 4. Hierarchical cluster analysis is helpful in grouping sets of objects that share similar characteristics, which builds a diversified portfolio of similarity. The similarity between objects was measured by squared Euclidean distances, and Ward's method of divisive hierarchical clustering for the cluster analysis.<sup>59</sup> The figure characterizes a dendrogram based on the cluster analysis of the LIS studies interest of iSchools in China. Cluster analysis combined samples of the interest of iSchool study areas into eight cluster groups. Group I consisted of electronic resources, university libraries, digital libraries, library services, information literacy, academic libraries, data management electronic commerce, social media, internet, information technology, knowledge sharing, service quality, user studies, information seeking, and continuance intention; Group II consisted of informetrics, citation analysis, citations, research evaluation, scientific collaboration, library and information science, and collaboration; Group III consisted of WeChat, trust, user behaviour, and e-government; Group IV consisted of self-efficacy, technology acceptance model, China, and e-learning; Group V consisted of deep learning, data mining, machine learning, e-commerce, clustering, information retrieval, innovation, knowledge transfer, social capital, satisfaction, neural networks, text mining, ResearchGate, sentiment analysis, and social network; Group VI consisted of GIS, cloud computing, artificial intelligence, topic model, visualization, social network analysis, information science, knowledge management, cellular automata, and big data; Group VII consisted of bibliometric analysis, research trends, co-word analysis, web of science, network analysis, ontology, bibliometrics, and coauthorship; group VIII consisted of twitter, altmetrics, scholarly communication, open access, sleeping beauty, scientometrics, and co-citation analysis. The cluster analysis groups are mainly derived from the different concepts of iSchools research.

This research has employed hierarchical clustering to present the different research interests of iSchools in China. The eight clusters of LIS subjects in Chinese iSchools are presented in Table 4. There are eight groups of hierarchical clusters across different interests. It was found that many keywords appeared in the hierarchical cluster. In addition, information technology and knowledge management are one of the representative concepts, and data science is the larger cluster that occurred in other studies.<sup>60-62</sup> A good clustering should generate a high-quality cluster with similar observations in some clusters and dissimilar observations in other clusters. Hierarchical cluster analysis is an iterative process to form various clusters.

There is a strong relationship between computing and iSchools, which support similar results found by I. Song and Y. Zhu.<sup>63</sup> In preparation for the future, many iSchools such as Wuhan University or Central China Normal University have added computing content mostly in big data to the curriculum, including an introduction to data science theory. The content covers discussion on data management, social media, and other issues arising from data collection, storage, analysis, and usage. Data science mainly trains students to scientifically collect, store, process, analyse, and use data in legal policy as well as ethical issues throughout the data lifecycle. Big data resources, key technologies of big data, and the application of big data have become important contents of Chinese iSchools. As a derivative of the internet in the internet era, big data permeates people's life and research as a way of thinking and a method of research. The combination of LIS and data science was a valuable step toward sustainable development<sup>64</sup> to meet society's needs,<sup>65</sup> which created a new opportunity for the development of LIS.

With the development of modern information technology and so called "soft sciences," the collection, selection, evaluation, and analysis of social information require data science and

**TABLE 4**  
**The 8 Clusters and Subjects of Current Research Interest in iSchools in China**

<b>clusters</b>	<b>concepts</b>	<b>clusters</b>	<b>concepts</b>
electronic resources; university libraries; digital libraries; libraries library services; information literacy; academic libraries; data management; e-commerce; social media; internet information technology; knowledge sharing; service quality; user studies; information seeking; continuance intention	Libraries; information technology and knowledge management	Informetrics; citation analysis; citations; research evaluation; scientific collaboration; library and information science; collaboration;	Scientific collaboration; and citation analysis
WeChat trust user behaviour e-government	E-government trust	self-efficacy; technology acceptance model; China; e-learning	Electronic learning in China
deep learning; data mining; machine learning; e-commerce; clustering; information retrieval; innovation; knowledge transfer; social capital; satisfaction; neural networks; text mining; ResearchGate; sentiment analysis; social network;	Social networks; deep learnings and information sharing and information	GIS; cloud computing; artificial; intelligence; topic model; visualization; social network; analysis; information science; knowledge management; cellular automata; big data;	Artificial intelligence; Social network analysis; cloud computing
bibliometric analysis; research trends; coword analysis; web of science; network analysis; ontology; bibliometrics; coauthorship	Bibliometrics; Ontology and Network analysis	Twitter; Altmetrics; Scholarly; communication; open access; sleeping beauty; scientometrics; co-citation analysis	Scientometrics and Altmetrics

big data to be the basis to achieve scientific decision-making services at different levels. Data analysis is the process of taking information and data as basic resources and research objects, and organizing and managing information and data effectively by analysing and mining big data in order to provide relevant services for users. Quantitative analysis is a crucial part of LIS, and data is an important resource. The collection and analysis of big data has become an important opportunity for the development of LIS. More and more researchers also fully realize that further value can be realized with the help of data science. Data is a gold mine,<sup>66</sup> and the development of an LIS relationship to data science has been found in this study for China as well as for other countries also.<sup>67, 68</sup>

According to the top ten keywords, big data was the main research field within iSchools investigations. S.J. Walker, Viktor Mayer-Schönberger, and Kenneth Cukier regarded the concept of big data as no longer only sampling data but all data; not precise data but fuzzy data focusing on correlation rather than causality.<sup>69</sup> Big data mainly refers to a new concept and thinking, and people should have a sense of the data surrounding their environment. LIS is the pioneer of information processing and application, and big data on the cultivation of

thinking should be an essential component in the curriculum system. The goal of big data is not only to enhance the professional competitiveness of graduates in the field of LIS but also to lay the foundation for big data literacy. From the perspective of curriculum training objectives, the major goal of big data is to train students in big data thinking and critical thinking in order to improve students' data literacy, enabling them to understand the basic concepts related to big data and put big data technology into practice.

In the era of big data, the scale of data resources presents an explosive and exponential trend, and the sources and types of data are highly complicated. As a center of information resource, libraries face great challenges in the construction, organization, and provision of big data resources due to the rapid growth of the digital and virtual collection of papers, collection of resources, and the assortment and preservation of various web-based resources and scientific research data. Therefore, LIS must cultivate students' awareness of basic concepts of big data and various sources of data, including sensors and social media, as well as the ability of data generation principle, data types of different genres, data collection and fusion, and data quality discrimination. It is worth noting that the information science is without boundary; therefore, it may affect other related fields like computer science and turn it into "iField," as coined by Bonnici, Subramaniam, and Burnett,<sup>70</sup> and by D. Wu. et al.<sup>71</sup>

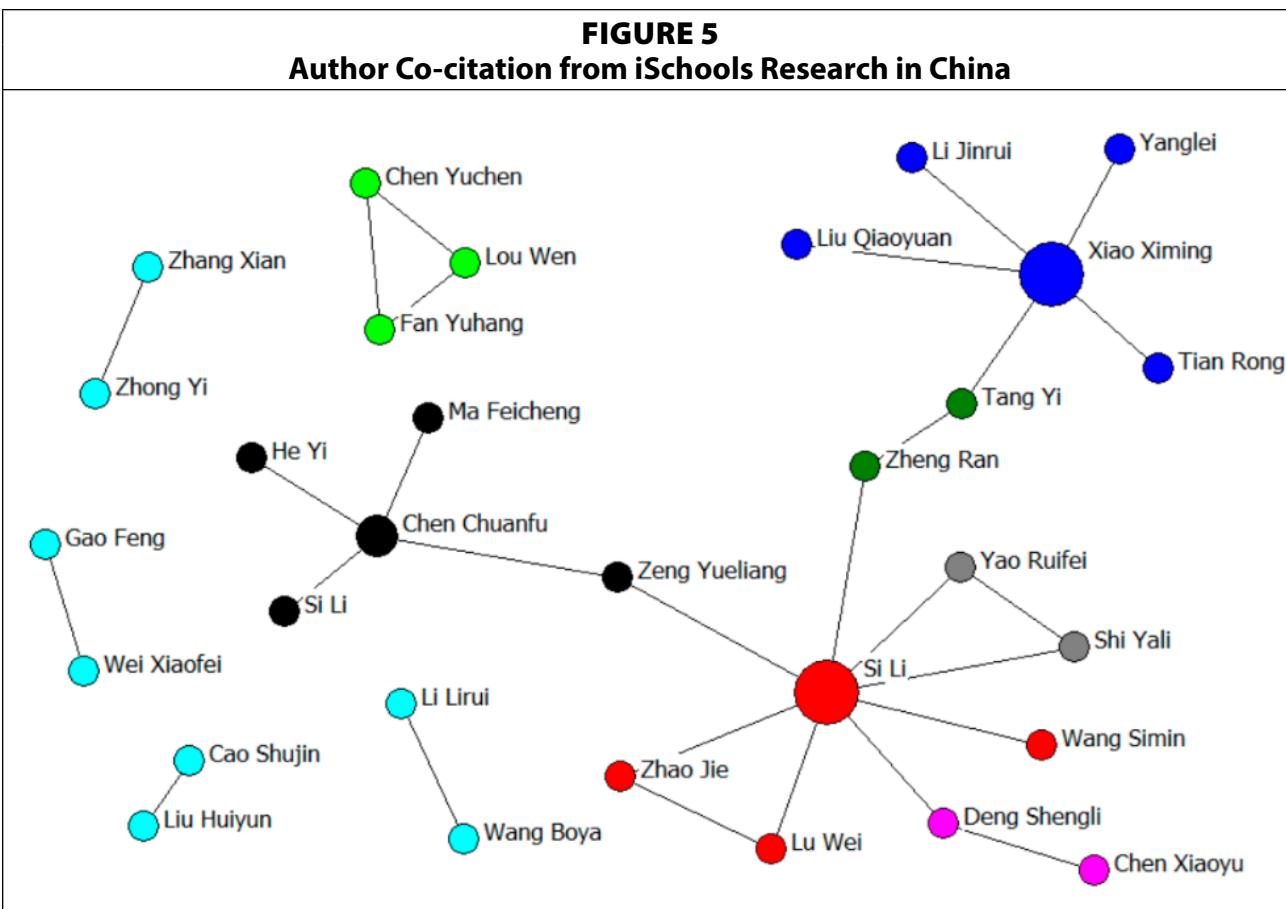
### *Authorship and Collaboration in Research of iSchools*

Co-citation analysis not only includes literature co-citation but also author co-citation, which can be used to evaluate the relationship of authors to LIS, revealing clusters with similar interests, perspectives, patterns, and backgrounds.<sup>72</sup> Author co-citation analysis establishes the citation relationship, with the author of the documents as the basic unit. When the documents of two authors are cited by a third document at the same time, a co-citation relationship is established. The frequently cited authors are closely related to the relevant research topic. Therefore, author co-citation analysis demonstrates that many authors can be gathered through the cited relationship to form a discipline group network. The impact of an author can be found in terms of citations and can be used to evaluate the contribution of an author to a specific field, which is why it exposes the intellectual structure of a subject.<sup>73</sup> The authors with the highest number of citations can be considered to play a significant and basic role in the development and evolution of LIS for Chinese iSchools.

Compared with the development of iSchools, the research on iSchools in China was considered at a later time. Many schools have joined iSchools, and a large number of them have been considered the diversified theme of iSchools.<sup>74</sup> The co-citation network refers to the citing authors (figure 5). Authors with a higher rate of co-citation trend were found to be closer to each other. From the co-citation view, Ximing Xiao, Li Si, and Chuanfu Chen were the most active scholars in iSchools who played a leading role in promoting the development of iSchools in China.

The selection of high-impact authors is the first step of the co-citation analysis. Since the contribution rate of the first author to academic achievement is the largest, this paper selected the first authors. At present, there are several studies on the selection of high-impact authors in the field of LIS. In this paper, high-impact authors were identified according to their citation frequency. These influential authors promoted the interdisciplinary development of LIS, which had a profound impact on the promotion of Chinese iSchools. Network density was a commonly used indicator in network analysis; it reflected the degree of close relationships between nodes.

**FIGURE 5**  
**Author Co-citation from iSchools Research in China**



In a co-cited network, the smaller the value of network density and the relationship between scholars, the lesser the cooperation, citation, and other relations, and the slower the knowledge exchange between academic networks. In contrast, the higher the value of network density, the closer the relationship between researchers, frequent cooperation, citation, and other behaviours promoting information exchange and scientific research cooperation. From figure 5, it was easy to discover that the author co-citation network displayed the density of information exchange and scientific cooperation by Chinese iSchools. As indicated earlier, iSchools seek experts from a variety of disciplines to cover multiple themes and bridge gaps; therefore, the displayed density of authors in figure 5 may be a reason for the interdisciplinary environment.<sup>75</sup> Researchers have contributed to various relevant researches requiring scholarly communication to advance, which is why iSchools are important to sustainability goals as “they develop the culture of sustainable data and information practices across different disciplines and businesses.”<sup>76</sup>

## Conclusion

The findings suggest that LIS related research is evolving and that this is still an emerging trend, as the analysis of iSchools publications demonstrates. Therefore, the five conclusions are as follows.

(1) iSchools are deemed to represent interdisciplinary characteristics of schools, which are involved with the development and usage of technology to manipulate information and data. Our results revealed that Chinese iSchools play an important role in LIS. The main scope of iSchools' publications is related to LIS, and their research interests are focused on topics such as big data, curriculum, health informatics, cultivating talents, etc.

(2) The study demonstrated that there are more opportunities for international cooperation among iSchools, as well as further research collaboration with China on iSchools. Moreover, the scholarly communication capacities in iSchools are increasingly diverse and different, especially concerning data, information, and knowledge.

(3) In the thematic review of publications, large-scale research with educational themes and social media were identified, which revealed their strong connection as well as the use of these networks to develop LIS education. This means that education development is an undeniable trend, especially in LIS. Talent development, on the other hand, was another highlighted theme in iSchools publications. The development of LIS requires modernization; therefore, recruiting more capable scholars and admitting good students will enhance the quality of publications as well as the scientific weight of the school. If the admission process considers graduates of other universities in China as well as in other countries, it would bring new ideas and new perspectives to the research. Although enrolment and career choices vary from student to student, designing a unified curriculum can draw the attention of high-potential students in order to educate and train them for the future “information society.” Finally, the dramatic development of information demands specific attention to acquisition, analysis, and archiving, all related to management as a highlighted topic in our findings, as well as being highly regarded in LIS and LIS training.

(4) iSchools attach great importance to the integration and development of data in the field of LIS. From the perspective of frequency words, the frequency ranking of data in iSchools research is very high. The frequency of the word “data” is generally in the top ranking, which indicates that data occupies a high proportion of iSchools research. The terms “data,” “data management,” “data storage,” “open data,” and so on are seen throughout. From the perspective of literature clustering, the literature related to data is closely associated with other research topics, indicating that data and the existing research themes in the field of LIS are blending. Strengthening the exploration of data will have great significance in the development of Chinese iSchools.

(5) With respect to the future of LIS, human-computer interaction is an essential scientific context to be considered; therefore, the iSchool curriculum should cover it to familiarize future users in the information society with related approaches, solutions, and tools with which to face new challenges.

For future work, it is recommended that those who join the iSchools consider the training goals of LIS, and especially that they analyze the landscape, research interests, and emerging trends not only within but also outside iSchools. Finally, it is suggested that the current approach be conducted in different countries in order to achieve a more global understanding of iSchools.

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# Authorship in Academic Librarianship Journals, 2015–2019: Evaluating Author Occupations, National and Institutional Affiliations, and Coauthorship

Erin Owens

This study evaluated authorship in academic librarianship journals by assessing factors such as occupation, institutional affiliation, national affiliation, and coauthor relationships. The findings showed increased coauthorship, reinforcing the findings of previous studies. However, academic library practitioners as authors declined. Authorship was dominated by English-speaking Western nations with very high Human Development Indexes (HDI), and U.S. authorship was disproportionately represented by research-intensive (R1) doctoral institutions. Implications for diversity of representation and relevance to applied practice are discussed, along with suggestions for journal editorial boards to evaluate their content solicitation and promotion, peer review processes, and author support services.

## Introduction

Librarianship as a profession has a known diversity problem in its workforce. The membership of the American Library Association in 2014 was 87.1 percent white, and Willa Tavernier noted that “access to the [LIS] field is largely limited to a homogenous cultural and socio-economic trajectory.”<sup>1</sup> The limited diversity among practicing librarians can be even further exacerbated in academic libraries because of additional cultural and socioeconomic barriers.

The twenty-first century has also seen significant discussion of diversity and inclusion in scholarly publishing. On the content side, a 2009 review found that only 1.5 percent of papers published in the top five economics journals focused on countries other than the United States, and scholars interested in low-income countries often refocused research on the U.S. to achieve publication.<sup>2</sup> On the staffing side, a survey by *Publishers Weekly* in 2015 found that the publishing industry workforce was still predominately white, and a panel the same year at the Society of Scholarly Publishing Annual Meeting addressed the need for more women leaders in scholarly publishing.<sup>3</sup> Several years later, the Diversity Baseline Survey from 2019 still shows an industry that is 76 percent white, 81 percent heterosexual, and 89 percent non-disabled.<sup>4</sup> But it’s not only about race and gender: the publishing sector is also “dominated by commercial publishers—as well as societies and academic presses—from the Global North,”

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and “current industry standards” have “severely limited the English-as-a-second language academics, early career researchers [*sic*], and international researchers.”<sup>5</sup>

Progress is increasingly being sought and fought for. The Coalition for Diversity & Inclusion in Scholarly Communications (C4DISC) was founded in 2017 to further discussion of and action towards improving diversity in scholarly publishing. And although many studies focus on aspects of gender and race, these are hardly the only limiting factors: C4DISC’s Joint Statement of Principles identifies a non-comprehensive list of identity groups, which includes geographic location, nationality/national origin, professional career level, socioeconomic background/social class, and more.<sup>6</sup> In 2020, the Association of University Presses (AUPresses) issued the Statement on Equity and Anti-Racism, in which they promise “to diversify our staff profiles and those of our authors, faculty boards, reviewers, and external suppliers.”<sup>7</sup>

For other such initiatives in modernizing scholarly communications, the library profession has been a visible ally. For example, with regard to open access publishing, the Association of College & Research Libraries flipped its flagship journal, *College & Research Libraries*, to a gold open-access publishing model in 2011 and approved a policy statement in 2019, which “recommends as standard practice that academic librarians publish in open access venues, deposit in open repositories, and make openly accessible all products across the lifecycle of their scholarly and research activity.”<sup>8</sup> Other scholarly journals published by divisions of the American Library Association (ALA), including *Reference and User Services Quarterly*, have also flipped to open access.<sup>9</sup>

Yet neither ALA itself, nor ACRL or any other division of ALA, has yet adopted the C4DISC Joint Statement of Principles. The Association of Research Libraries (ARL) joined during the drafting of this paper, in June 2021, and only six university libraries are so far represented in the list of adopting organizations.<sup>10</sup> Compared to the traction seen with scholarly communication endeavors related to open access, academic libraries seem thus far less engaged in spearheading inclusion efforts in their field’s journals and serving as role models to the researchers they support across many disciplines—despite calls from within the profession, such as Charlotte Roh’s petition for librarians to “be explicit about the inequalities in scholarly publishing” and “take action to avoid reproducing them.”<sup>11</sup>

When diversity challenges in the LIS discipline are coupled with inclusion problems in the scholarly communication systems, the risk seems clear: a body of disciplinary literature that narrowly reflects only one type of experience and excludes others. April Hathcock calls on us to “pause and reflect …on who is being excluded from the forward motion in scholarly communication.”<sup>12</sup> As the library and information science profession works to increase diversity and inclusion in its disciplinary scholarship, knowing who is presently included or excluded is an imperative starting point. This study seeks to evaluate the current state of diversity and inclusion in academic librarianship journals by considering the occupations, institutional affiliations, national affiliations, and collaborative relationships of authors. Note that this study did not engage with diversity factors such as gender or race, for specific reasons discussed in the Methodology.

## Literature Review

Past studies that surveyed author characteristics and collaborations form a historical foundation and comparison point for the current study. Studies which did not focus in some way on academic librarians or academic librarianship have generally not been included.<sup>13</sup> Although

individual studies occasionally incorporated less typical metrics, four author characteristics clearly emerged as standard ways of comparing authors in library and information science: occupation, institutional affiliation, national affiliation, and sex.

### ***Author's Occupation***

Author occupation often appears as a comparison among different types of librarians or else professional librarians versus non-librarians. Study findings varied depending on the journals selected, and numbers have fluctuated somewhat over time, but taken together they suggest a general trend of decline in the proportion of authors who are practicing academic librarians.

Kim and Kim found that the proportion of articles by academic librarians in *College & Research Libraries* (C&RL), 1957 to 1976, remained relatively consistent (between 57 and 61%), although contributions from non-administrative librarians increased.<sup>14</sup> Krausse and Sieburth investigated authorship in twelve library journals to determine whether publications by practicing academic librarians were increasing as faculty status and pressure to publish rose: out of more than 4,000 articles examined, they found 34.4 percent written by academic librarians, the majority of which appeared in C&RL and *Journal of Academic Librarianship* (JAL).<sup>15</sup> In analyzing 1939–79 C&RL articles, Cline reported almost 60 percent of contributions from academic libraries.<sup>16</sup> Metz built on Cline's landmark study to further analyze C&RL through 1988 and found that the proportion of authors in academic libraries held relatively steady with only a slight decline, from 58.7 percent in 1939–79 to 56.12 percent in 1980–88.<sup>17</sup> Terry found a slight increase in 1989–94 C&RL data: 70.1 percent of authors were affiliated with academic libraries.<sup>18</sup>

Weller, Hurd, and Wiberley studied 32 library journals from 1993 to 1997, finding academic librarians as authors of 43.6 percent of the peer-reviewed articles. In nineteen journals, academic librarians authored one-third or more of the articles. But when analyzing similar data points from 1998 to 2002, Weller, Hurd, and Wiberley found declines in the "number of refereed articles by academic librarians (almost 13%), the proportion of refereed articles by academic librarians (just over 4%), the proportion of academic librarian authors (almost 3%), and the proportion of coauthored articles by academic librarians (almost 4%)."<sup>19</sup>

Finally, Blecic, Wiberley, De Groote, Cullars, Shultz, and Chan studied authorship by U.S. academic library practitioners in forty-one refereed journals in library science over a ten-year period (2003–12).<sup>20</sup> They found 37 percent of refereed articles with at least one U.S. academic librarian author. However, they also recorded "a long-term trend of decline in the proportion of that contribution [by academic librarians to their field's literature]."<sup>21</sup>

### ***Author's Institutional Affiliation, Including Carnegie Classification***

For analyzing authorship by institutional affiliation, simple proportions of authorship from individual institutions are sometimes compared, but Carnegie Classification has been used frequently by researchers since its inception in 1970. The Carnegie Classification of Institutions of Higher Education® describes institutional diversity in the United States based on empirical data including enrollments, completions, research expenditures, etc. For instance, "institutions that awarded at least 20 research/scholarship doctoral degrees during the update year and also institutions with below 20 research/scholarship doctoral degrees that awarded at least 30 professional practice doctoral degrees in at least 2 programs" are all grouped together as Doctoral Universities.<sup>22</sup> These are further subdivided into three categories as follows: *R1: Doctoral Universities-Very high research activity*; *R2: Doctoral Universities-High research activity*; *D/*

*PU: Doctoral/Professional Universities.* Though all three of these categories meet similar criteria for degrees awarded, R1 and R2 categories include “only institutions that awarded at least 20 research/scholarship doctoral degrees *and* had at least \$5 million in total research expenditures (as reported through the National Science Foundation (NSF) Higher Education Research & Development Survey)” (emphasis added).<sup>23</sup> The Carnegie Classification system includes “all Title IV eligible, degree-granting colleges and universities in the 50 United States, the District of Columbia, and the territories and commonwealths …represented in the National Center for Education Statistics IPEDS system.”<sup>24</sup> Details for all of the classification definitions can be found on the Carnegie Classification website, along with extensive tools for data search and download.

Past studies of library journals have consistently shown higher rates of authorship from larger institutions or those with higher Carnegie Classifications. Krausse and Sieburth evaluated author institutions and concluded that academic libraries with larger collections contributed more publications than small academic libraries.<sup>25</sup> Cline found that the top ten institutions represented by author affiliation in *C&RL* comprise the Library of Congress, the American Library Association, and eight universities that had an R1 Carnegie Classification in 1987 (the oldest dataset available).<sup>26</sup> Budd and Seavey examined thirty-six national, refereed, library and information science journals over five years, testing the assumption that academic librarians were encouraged to publish to retain employment; they found that most contributions came from authors affiliated with a small number of four-year institutions.<sup>27</sup> Hernon, Smith, and Croxen found that 92.5 percent of authors with papers accepted by *C&RL* were affiliated with academic institutions; among those, 77.7 percent were from doctoral institutions, 16.1 percent from Master’s institutions, and 6.2 percent from baccalaureate and associate’s institutions.<sup>28</sup>

### ***Author’s National Affiliation, Including Human Development Index (HDI)***

Past studies have shown an interest in what countries are most represented or least represented in library journal authorship according to the authors’ national affiliation. Hernon, Smith, and Croxen found that 92.5 percent of authors with papers accepted by *C&RL* worked in the U.S., 2.8 percent worked in Canada, 0.7 percent worked in Nigeria, and the remaining 2.0 percent represented just seven other countries.<sup>29</sup> (Note, however, that the count of authors by country total only 552–520 U.S. + 31 international—while the article indicates there were 562 total individuals, so these percentages may be slightly flawed by this discrepancy in *N*.)

In a study of international librarian collaborations, Kozlowska and Scoulas leveraged the Human Development Index (HDI) as a metric for comparing authors’ national affiliations, finding that 70 percent of librarian collaborators came from “very high” Human Development Index (HDI) and predominately English-speaking countries.<sup>30</sup> HDI is a means of assessing a country’s development by more than just economic traits such as gross domestic product (GDP). HDI summarizes “average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have *[sic]* a decent standard of living.”<sup>31</sup> According to the United Nations documentation, countries ranked at or above 66 are categorized as *Very High HDI* countries, while rankings of 157 or below are categorized as *Low HDI*. This metric provides a way to go beyond which specific countries contributed the highest or lowest proportions of authors and to compare authorship among types of countries in terms of development and privilege, in much the same way that Carnegie classifications can be used to understand the types of institutions from which authorship originates.

### *Sole Versus Collaborative Authorship*

Many past studies of library science authorship have examined collaboration, comparing the rates of sole versus collaborative authorship, the quantity of authors in collaborations, or the nature of collaborations in terms of occupation, nationality, or institutional affiliation. Taken together, past studies show a trend of declining sole authorship and increasing collaborative authorship.

Cline found that sole-author papers accounted for 95.65 percent of *C&RL* publications in 1939 to 1944; this dropped to 72.68 percent for 1975–1979, showing that collaboration was increasing but was still the minority.<sup>32</sup> When Metz continued Cline's analysis through 1988, collaboration continued to grow more common, with sole authorship dropping to 54.1 percent in 1985–1988.<sup>33</sup> Starratt and Person reported on author traits in *C&RL* and *JAL*: 22 percent of articles had exactly two authors, and 31 percent had at least two authors or more.<sup>34</sup> Hernon, Smith, and Croxen found that 35.1 percent of accepted papers in *C&RL* had more than one author.<sup>35</sup> Terry, continuing to build on Cline's and Metz's line of enquiry into *C&RL* authorship, found that 59.5 percent of articles from 1989 to 1994 included more than one author.<sup>36</sup>

Bahr and Zemon analyzed authorship collaboration in *C&RL* and *JAL* from 1986 to 1996, finding that 40 percent of articles published in *C&RL* and 29 percent in *JAL* were collaborative. Most collaborations had two authors: 72 percent in *C&RL* and 78 percent in *JAL*. University librarians were most likely to collaborate with another university librarian; the small number of other collaborators included library science faculty, faculty in other disciplines, librarians from junior college or public libraries, and vendors.<sup>37</sup>

Blecic, Wiberley, De Groote, Cullars, Shultz, and Chan found that, among articles by U.S. academic library practitioners in forty-one refereed journals in library science from 2003 to 2012, 51.04 percent were coauthored.<sup>38</sup> Norelli and Harper sampled 500 articles from *JAL*, *C&RL*, *Research Strategies*, and *portal: Libraries and the Academy*; they found 48 percent single-authored and 52 percent coauthored papers.<sup>39</sup> Luo and McKinney focused narrowly on *JAL* publications, finding 45.7 percent single-authored and 54.3 percent with multiple authors.<sup>40</sup> Luo and McKinney further found that the majority (74.5 percent) of sole authors were librarians; among multiauthor papers, more than half (52%) were collaborations between librarians, while a little over one quarter (25.2%) were partnerships between librarians and non-librarians. Another 22.8 percent were collaborations entirely among non-librarians. In 62.2 percent of collaborations, coauthors came from the same institution.

Most recently, Kozlowska and Scoulas examined collaboration between U.S. and international librarians, the majority of whom (66.09 percent) were from doctorate-granting institutions. Only 17 percent of respondents had published with international collaborators, and 70 percent of collaborators came from "very high" Human Development Index (HDI) and predominately English-speaking countries, revealing "the amount of geographical disparity in terms of who has access and who is excluded from scholarly communication."<sup>41</sup>

### *Author's Sex*

Numerous studies have used author sex as another trait for evaluating authorship trends, whether looking at all authors or lead authors only, including Cline; Buttlar; Olsgaard and Olsgaard; Starratt and Person; Håkanson; Hernon, Smith, and Croxen; Terry; and Zemon and Bahr. The studies vary in terms of whether they label this characteristic as *sex* or *gender*, and clarity is generally lacking regarding whether the researchers were seeking to compare sex assigned at birth, gender identity, or perhaps gender presentation as perceived by others.

Sex was usually classified according to a male/female binary based on the traditional associations of given names. Because these methods are questionable (as will be discussed further in the Methodology section), the findings themselves are questionable as well and thus are not included in this review.

### ***Increase in and Motives for Author Collaboration***

In reviewing the existing literature, the primary focus was on studies of authorship in academic librarianship journals, but some further examination of the increase in and motives for research collaboration was also helpful to establish context for analysis of coauthorship.

The existing literature shows that collaborative authorship has increased significantly in library and information science over the past sixty years. This same trend can be seen across disciplines over the past four decades or more: for example, the number of authors per paper in biomedicine, chemistry, and mathematics has been increasing since 1980, and a similar increase in authors per paper and a decline in sole-authored papers can be seen in business scholarship.<sup>42</sup> Although specific disciplines vary in scale, this shift in authorship has even held true across the humanities and social sciences.<sup>43</sup>

These shifts in authorship may stem from many influencing factors, such as changes in funding patterns, increased specialization, training and mentorship, division of labor (with more authors, each is responsible for less of the final product), risk aversion (“it is better to spread your risks by submitting, say, four papers by four authors than one solo-authored paper,” say Kuld and O’Hagan) and more sophisticated communication and transportation technology.<sup>44</sup>

Recent findings by Tran and Chan studying librarian motivations for research collaborations identified significant influence from “seeking expertise that you lack,” which may relate to both the increase in specialization and the need to benefit from others’ skills, as well as “Distributing the workload” and “Seeking a sounding board.”<sup>45</sup>

It is also worth noting that diversity itself is at least a potential outcome, if not a driving motivation, for research collaboration. Dr. Haseeb Md Irfanullah observes that “North-South and South-South collaborations in research projects are recognized and practiced modes of increasing diversity.”<sup>46</sup>

### ***Informing the Current Study***

While several of the studies reviewed have been defining landmarks in understanding who publishes scholarly library science articles, many of them are also between ten and forty years old, and the most recent works have focused primarily on collaboration, so data regarding other characteristics is particularly dated. Additionally, past studies have either analyzed a much broader swath of library and information science journals or else have focused almost entirely on *C&RL*. After reviewing this existing landscape of literature, the current study finds an opportunity to update our knowledge of who authors scholarly library science articles by examining more recent volumes in a thematically related pool of journals according to a constellation of author characteristics.

### **Aims**

This study sought to examine the diversity of authorship in journals focused on academic librarianship, guided by a question: How diverse were authorships according to factors such as occupation, institutional affiliation, national affiliation, and collaboration?

## Methodology

Searches were first conducted to identify peer-reviewed journals that were focused exclusively on academic librarianship, as opposed to librarianship generally or a specialized subfield, such as electronic resources or user services. Eight key journals were included in data collection (see table 1). Throughout this article, these journals will be referred to by the shorthand references in table 1.

TABLE 1 Details of Journals Considered and Selected		
Shorthand Reference	Journal Title	Excerpt from Mission or Scope
CJAL	<i>Canadian Journal of Academic Librarianship</i>	"...topics related to the profession of academic librarianship," "by and about any academic library workers" <sup>47</sup>
C&RL	<i>College &amp; Research Libraries</i>	"...all fields of interest and concern to academic and research libraries" <sup>48</sup>
C&UL	<i>College &amp; Undergraduate Libraries</i>	"...supports the continuous learning of academic library staff to become more effective professionals" <sup>49</sup>
JAL	<i>Journal of Academic Librarianship</i>	"...articles that focus on problems and issues germane to college and university libraries... a forum for... research findings and their practical applications" <sup>50</sup>
NRAL	<i>New Review of Academic Librarianship</i>	"...applicability of theory and/or research for the academic library practitioner" <sup>51</sup>
Portal	<i>portal: Libraries and the Academy</i>	"...research about the role of academic libraries and librarianship... for all those interested in the role of libraries within the academy" <sup>52</sup>
PAL	<i>Practical Academic Librarianship</i>	"...scholarship with an emphasis on the practical side of academic library work" <sup>53</sup>
PSQ	<i>Public Services Quarterly</i>	"...public service issues in academic libraries, presenting practical strategies for implementing new initiatives and research-based insights into effective practices" <sup>54</sup>

## Selection of Authorship Characteristics for Study

Informed by the literature review, the present study chose to adopt for study the author characteristics of occupation; institutional affiliation, including Carnegie Classification; national affiliation, including Human Development Index (HDI); and collaboration. Use of these metrics in the current methodology will allow closer comparison to past findings and continue adding to a consistent knowledge base for future studies to build on. Although Carnegie Classifications are only assigned for institutions in the United States, because it is a standard system for comparing U.S. institutions and has been frequently cited in past studies it nevertheless serves as a useful data point for evaluating at least a portion of authorships.

Although many past studies included author sex as a factor for evaluating diversity, the present study ultimately chose to exclude this trait. Most past studies have classified sex based on author names, assuming that certain names are, within specific cultures, traditionally associated with male or female sex assigned at birth. However, this practice is imprecise, hampered

by cultural assumptions, and biased towards a binary worldview. To begin with, names may be differently associated in different cultures, and some families may assign names counter to their traditional sex association. Additionally, individuals may choose to adopt names other than those assigned at birth, which may or may not have any personal or cultural association with their sex assigned at birth or their gender identity. And finally, an attempt to force all individual authors into binary male/female categories negates the dignity of individuals who were born intersex or who identify differently along the spectrum of gender.

The only accurate approach would be direct contact with authors to request self-identification of gender identity specifically, separate from sex assigned at birth, including non-binary options. Such a direct survey of authors was initially considered as a method for the present study to obtain self-identification of gender identity as well as racial and ethnic identity. However, that approach was eventually abandoned due to the complexity of finding viable contact information: many articles included emails only for first authors, not all of which were still valid contacts, and identifying current contact information for all authors was challenging due to factors such as changing affiliations over time, name changes, ambiguously common names, language barriers on international institution websites, retirement, and death. Additionally, the researcher was concerned that this information request could be perceived as personally intrusive and doubted whether the resulting response rate would yield statistically significant data. Ultimately, sex, gender, and race were excluded as author traits for analysis.

### ***Data Collection: Stage One***

The first stage of data collection involved compiling article-level data from the table of contents of each issue in the five-year period from 2015 to 2019. Data for 2020 was initially collected as well, but has not been analyzed so as to control for potential variation related to the COVID-19 pandemic. Core article metadata was exported from databases on the EBSCOhost platform and then verified against the official publisher websites while copying author affiliation information from each article. For each article title, author name(s) and institutional affiliation(s) were collected in addition to the journal, volume, and issue. Data was collected only for articles; editorials, columns, and book and resource reviews were omitted. However, whereas some previous studies focused only on original research articles while excluding works like review articles, this study included review articles, case studies, and other explorations of professional theory, philosophy, or practice alongside empirical research.

A few seeming omissions appear in the dataset. Volume 76 issue 3 of *C&RL*, a special issue, was omitted, because all content comprised classic articles or commentaries on those classics, as opposed to newly published research. A significant amount of *PSQ* content was classified as columns, so the data for that publication appears smaller than the issues as published. *CJAL* began publishing in 2016 and therefore lacks 2015 content, while *PAL* lacks 2019 issues as it was on hiatus that year.

### ***Data Collection: Stage Two***

In the second stage of data collection, each author's occupation was coded, and the country of institution, HDI of country, and Carnegie Classification of U.S. institution were added as applicable. Additionally, each article was coded with regard to sole or collaborative authorship, quantity of collaborators, and types of collaboration. Codes for author occupations are shown in table 2, and codes for collaboration types in table 3; the nuances of this coding were

**TABLE 2**  
**Author Occupation Codes**

<b>Code</b>	<b>Occupation</b>	<b>Definition</b>
<b>1</b>	<b>Academic Library</b>	Author is employed in an academic library in any role
<b>2</b>	<b>Academia, Non-Library</b>	Author is employed in, or a student in, higher education but not employed in an academic library
<b>3</b>	<b>Non-Academic</b>	Author is employed outside of higher education

governed by additional rules, which are explained in tables A1 and A2 in appendix A. The coding of author occupation and collaboration type was all completed by a single coder (the author), and comparisons between records were performed regularly to verify consistency.

**TABLE 3**  
**Codes for Describing Author Collaboration Types**

<b>Code</b>	<b>Type</b>	<b>Definition</b>
<b>1</b>	<b>Internal: Library</b>	All coauthors share an institutional affiliation and all work in an academic library
<b>2</b>	<b>Internal: Mixed</b>	All coauthors share an institutional affiliation; at least one works in an academic library, and at least one works outside an academic library
<b>3</b>	<b>Internal: Non-Library</b>	All coauthors share an institutional affiliation, but none work in an academic library
<b>4</b>	<b>Internal: Undetermined</b>	All coauthors share an institutional affiliation, but at least one cannot be classified inside or outside an academic library
<b>5</b>	<b>National: Library</b>	Coauthors are affiliated with at least two different institutions, all within academic libraries, and share the same country affiliation
<b>6</b>	<b>National: Mixed</b>	Coauthors are affiliated with at least two different institutions, at least one in an academic library and at least one outside an academic library, and share the same country affiliation
<b>7</b>	<b>National: Non-Library</b>	Coauthors are affiliated with at least two different institutions, none within academic libraries, and share the same country affiliation
<b>8</b>	<b>National: Undetermined</b>	Coauthors are affiliated with at least two different institutions and share the same country affiliation, but at least one cannot be classified inside or outside an academic library
<b>9</b>	<b>International: Library</b>	Coauthors are affiliated with at least two different institutions, all within academic libraries, in at least two different countries
<b>10</b>	<b>International: Mixed</b>	Coauthors are affiliated with at least two different institutions, at least one in an academic library and at least one outside an academic library, in at least two different countries
<b>11</b>	<b>International: Non-Library</b>	Coauthors are affiliated with at least two different institutions, none within academic libraries, in at least two different countries
<b>12</b>	<b>International: Undetermined</b>	Coauthors are affiliated with at least two different institutions in at least two different countries, but at least one cannot be classified inside or outside an academic library

Next, the Human Development Index (HDI) rank for each country was added to the data records, using the 2019 rankings from the United Nations.<sup>55</sup> Lastly, the Carnegie Classification was added for each author affiliated with a U.S. institution, based on the Carnegie 2021 Update Public File.<sup>56</sup> For reference, Table A3 in Appendix A lists the Basic Classifications assigned by the Carnegie system and how they have been grouped and abbreviated for analysis in this paper.

The dataset generated and analyzed during the current study is available in the Scholarly Works @ SHSU institutional repository at <https://shsu-ir.tdl.org/handle/20.500.11875/3601>.

## Results

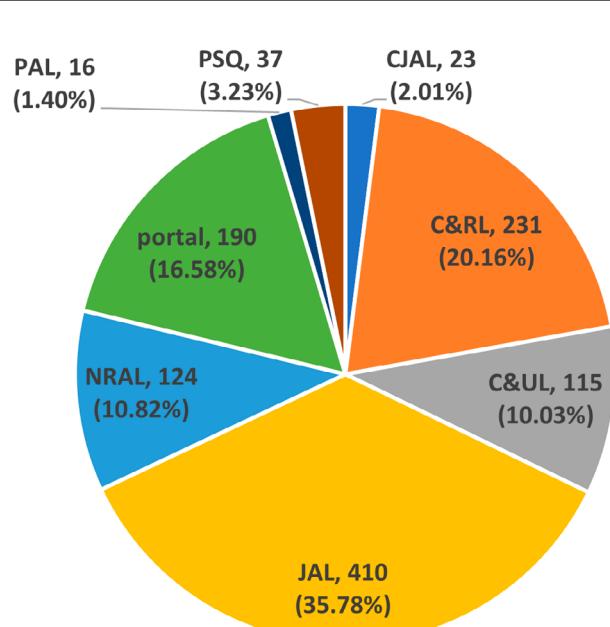
### Article and Author Counts

A total of 1,146 articles appeared in issues of the eight selected journals dated 2015 through 2019. Figure 1 illustrates the article count and percentage that each journal contributed to this dataset. In total, these articles included 2,472 authorships—meaning the total number of names in bylines, without accounting for individuals who may be associated with more than one article. The percentage of authorships contributed by each journal were closely aligned with the percentage of articles contributed (see figure 2), generally varying by no more than 1.4 percent for each journal except *C&RL*, which contributed 1.8 percent more authors than articles.

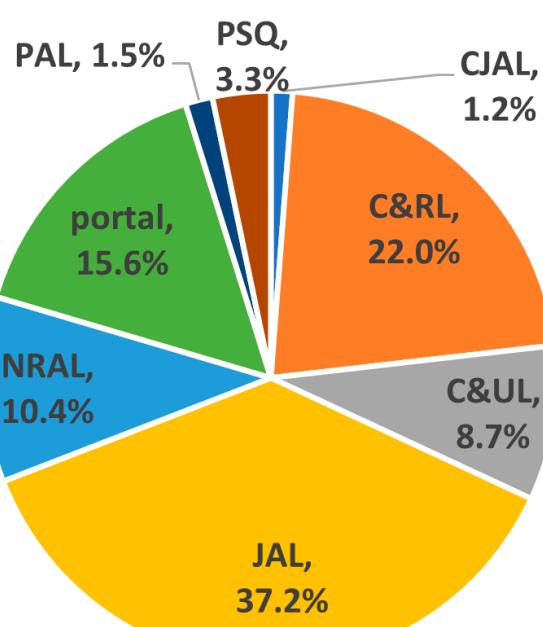
### Author's Occupation

Among the individual authors, 70.2 percent were employed in academic libraries; 27.1 percent were employees or students in higher education but not employed in academic libraries; and 2.7 percent were not employed in higher education. This yields a total of 29.8 percent that are outside academic libraries.

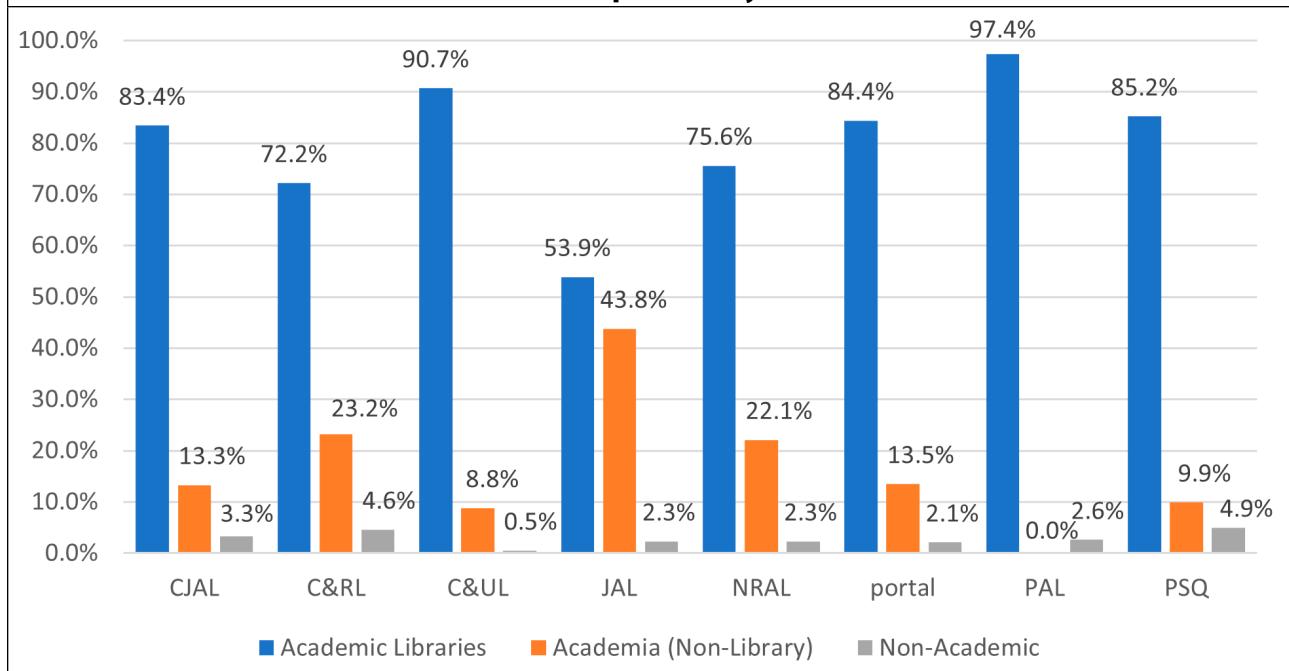
**FIGURE 1**  
Articles per Journal



**FIGURE 2**  
Authorships per Journal



**FIGURE 3**  
**Author Occupations by Journal**



Author occupations varied among the eight journals studied (see figure 3). *PAL* stood out as having the most authors employed in academic libraries (97.4%), while *JAL* had the fewest (53.9%), but all titles had greater than 50 percent of authors from academic libraries. Meanwhile *JAL* had the greatest number of non-library higher education authors (43.8%), and *PAL* had the fewest (0.0%). No journal had more than 4.9 percent of authors who worked outside of higher education.

#### *Author's National Affiliation, Including Human Development Index (HDI)*

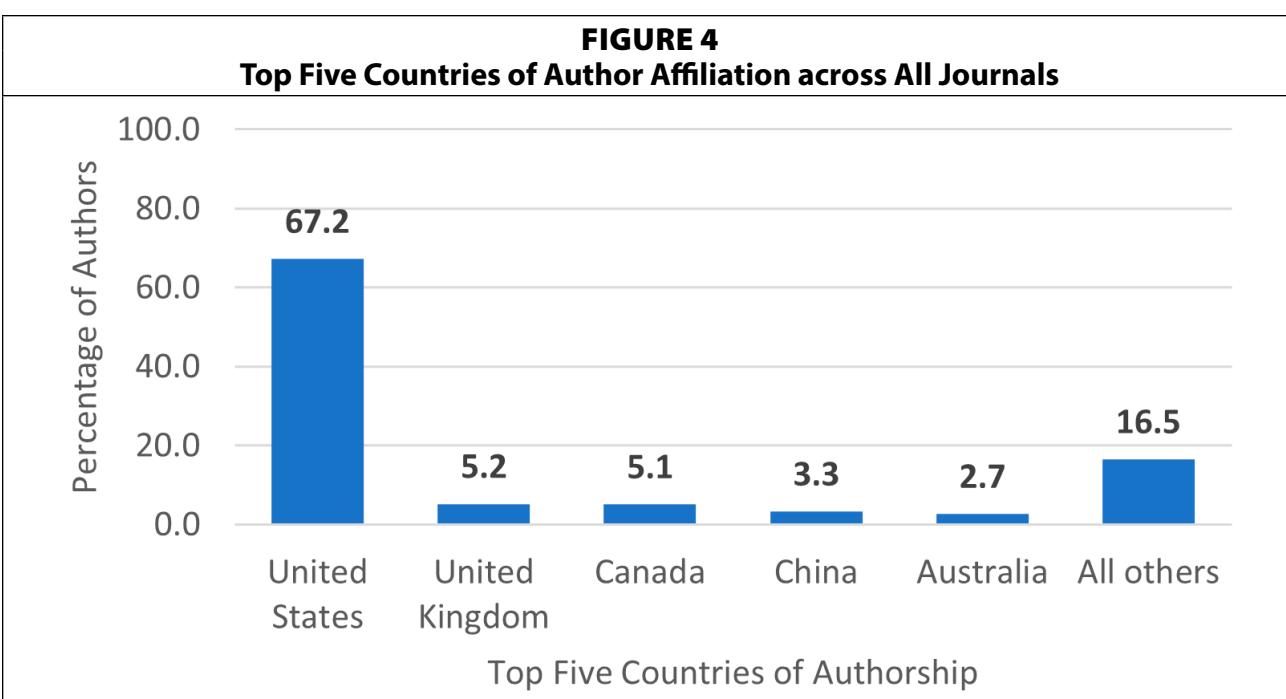
Of all authorships, 67.2 percent were from authors affiliated with the United States; no other country came close: the next country in order, the United Kingdom, accounted for only 5.2 percent of authorships (see figure 4). Canada produced 5.1 percent of authorships (with just three fewer authors than the United Kingdom); China and Australia rounded out the top five countries with 3.3 percent and 2.7 percent respectively. No other country achieved more than 1.8 percent of total authorships. Another fifty-one countries of authorship combined represented just 16.4 percent of the total authorships (see the appendix for details); two authorships (0.08%) had unknown national affiliations.

*CJAL* is positioned as a national publication, as the word *Canadian* in its name clearly implies, and its authorship reflects that reality: 73.3 percent of its thirty authors had Canadian affiliation. The other 26.7 percent had U.S. affiliation. No other national affiliations were represented (see figure 5).

*PAL* and *PSQ* were even more skewed towards a dominant country of authorship: *PAL* saw 84.2 percent authorship from the U.S. and 15.8 percent from Canada, while *PSQ* saw 96.3 percent from the U.S. and 3.7 percent from Canada. Neither represented authorships from any countries except the U.S. and Canada (see figure 5).

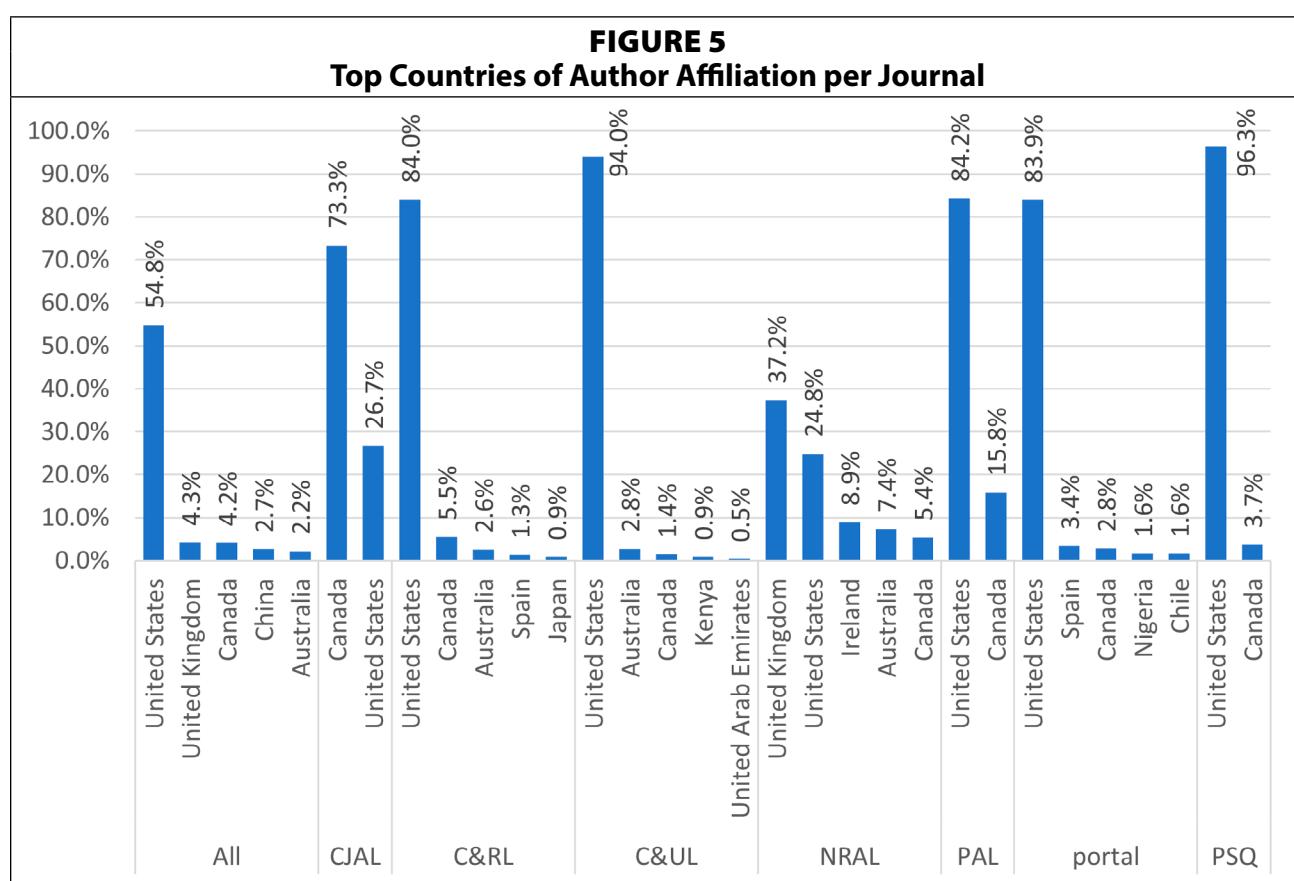
*C&UL* boasted 93.9 percent U.S. authorship; Australia was the only other country to break 2 percent, with six authors for 2.8 percent of *C&UL* authorships (see figure 5). Only four other

**FIGURE 4**  
**Top Five Countries of Author Affiliation across All Journals**



countries were represented (Canada, Kenya, United Arab Emirates, and Hong Kong) with between one and three authors each. (Although Hong Kong is not an entirely independent country, it is a special administrative region with governing and economic systems separate from the rest of the People's Republic of China [PRC], and it is scored separately in the Human Development Index; thus, it is addressed separately in this paper as well.)

**FIGURE 5**  
**Top Countries of Author Affiliation per Journal**



Meanwhile *portal* reflected less exaggerated but still dominant U.S. authorship: 324 of 386 authorships (83.9%) originated in the U.S. (see figure 5). No other country came close; next was Spain, with 13 authors (3.4%) and Canada with 11 authors (2.8%). The remaining authorships were divided among fifteen other countries, which are listed in full in appendix D.

*C&RL* reflected a very similar majority of U.S. authorship, with 456 of 543 authorships (84.0%) from the U.S. (see figure 5). Canadian affiliations made up another 5.5 percent, and Australia yielded 2.6 percent. Another fifteen countries were represented with between seven or fewer authors; these are listed in full in appendix D. Two authors (0.4%) had unknown national affiliations.

*JAL* was still heavily U.S.-authored: of its 920 authors, 497 (54.0%) are from the U.S., and yet *JAL* also represented the largest number of other international affiliations, including authors from forty-four other countries. Rounding out the top five with at least twenty-five authors each were China (8.4%), Canada (4.0%), United Kingdom (3.0%), and Australia (2.8%) (see figure 5). The rest are listed in full in appendix D.

The 258 authors in *NRAL* represented 37.2 percent authorship from the United Kingdom, followed by the U.S. (24.8%), Ireland (8.9%), and Australia (7.4%) (see figure 5). The remaining authorships (21.7%) were dispersed among another sixteen countries, listed in full in appendix D—so *NRAL* stood out with less U.S. dominance, but still an anglophilic focus and also not as broad an international representation overall.

Very High HDI countries accounted for 92.2 percent of all authors (both sole and collaborating), 97.1 percent of sole authors, 91.2 percent of all collaborating authors, and 78.3 percent of international collaborators specifically. Only 0.8 percent of all authors, 0.5 percent of sole authors, 0.9 percent of collaborating authors, and 0.0 percent of international collaborators were affiliated with Low HDI countries (see figure C-1 in appendix C).

Looking at individual journals, *CJAL*, *PAL*, and *PSQ* entirely comprised authors from countries with Very High HDI (see figure 6). *JAL* authorship was still predominately Very High HDI (83.8%), though they also included 12.9 percent authors from High HDI countries. Every other HDI category saw less than 3 percent authorship in any given journal. *NRAL* had the greatest representation of both Medium HDI authors (2.7%) and Low HDI authors (2.3%).

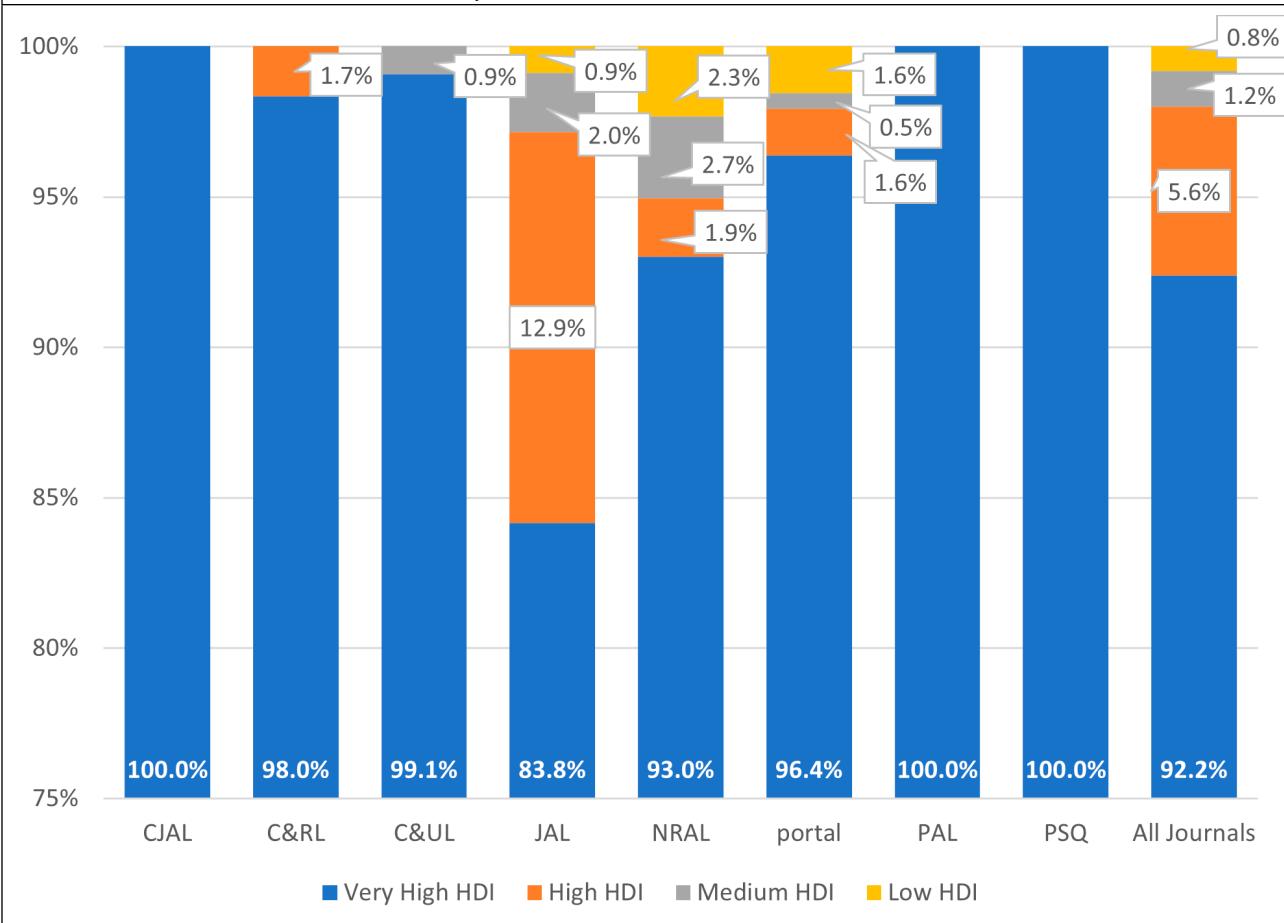
### ***Author's Institutional Affiliation, Including Carnegie Classification***

Carnegie Classifications were clearly identifiable for a total of 1618 authorships. Of those, 48.5 percent originated from R1 institutions specifically, and 73.3 percent originated from doctoral universities of some degree (R1, R2, or D/PU). Another 16.7 percent of authorships originated from Master's Universities (M1, M2, or M3), and 8.7 percent originated from Baccalaureate, Associate's, or Special Focus institutions. Zero authorships originated from Tribal Colleges. Figure 7 shows the breakdown of U.S. authorship by classifications (the abbreviations are explained in table A-2).

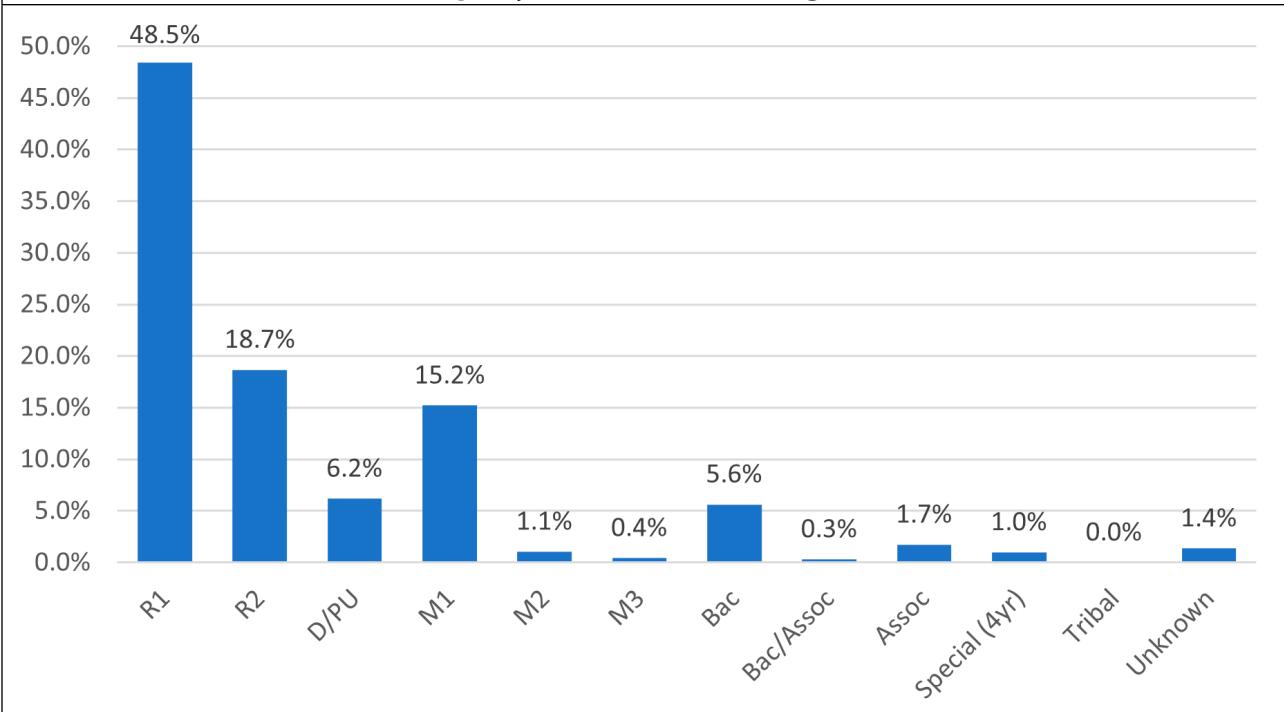
For context, only 3.0 percent of U.S. institutions are classified as R1 and 9.6 percent as Doctoral (R1, R2, or D/PU). Meanwhile 15.8 percent are classified as Master's (M1, M2, or M3) and 74.5 percent as Baccalaureate, Associate's, Special Focus, or Tribal. Figure 8 shows all U.S. institutions by Carnegie Classification, representing an almost inverse distribution compared to authorships.

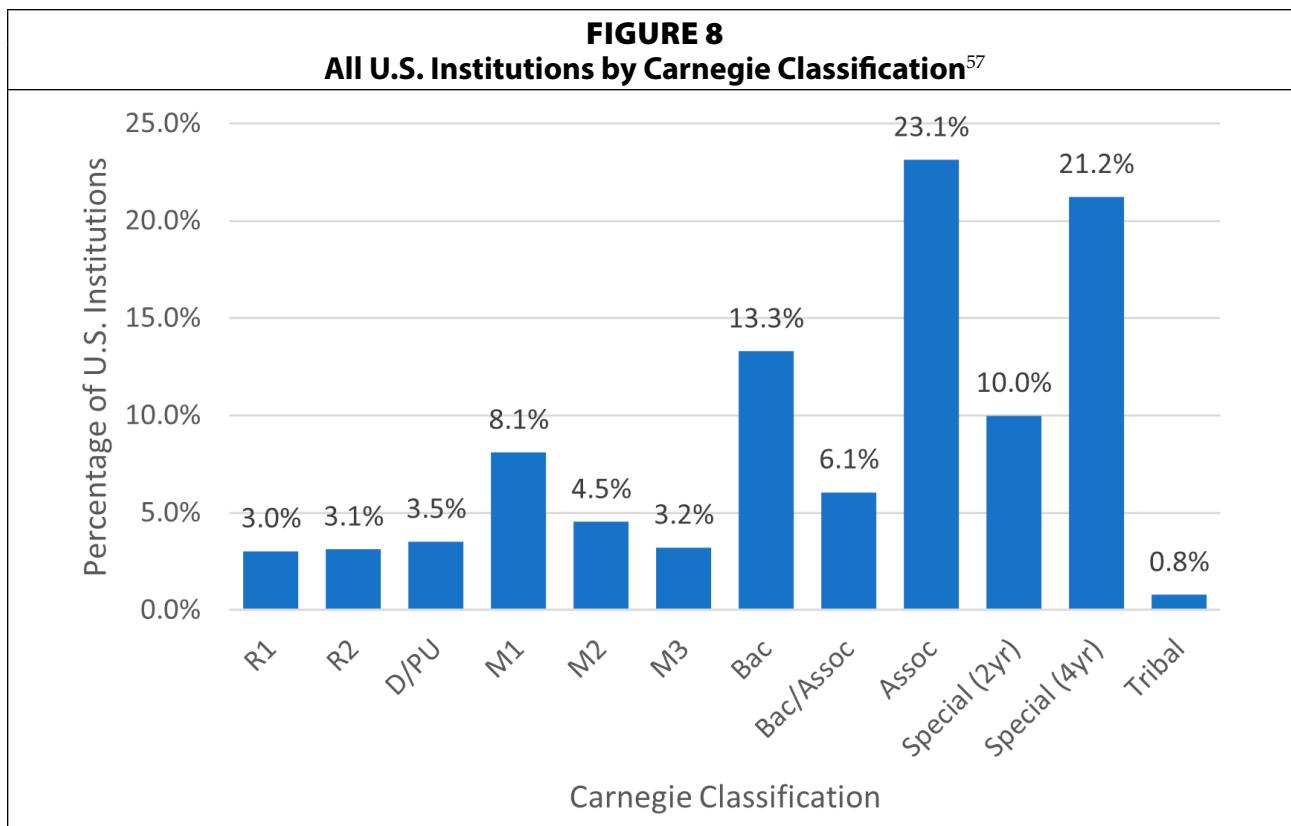
Among the eight journals analyzed, *CJAL* appeared to have the highest rate of R1 authorship at 71.4 percent, but as it had only seven authors at Carnegie-classified institutions, this number

**FIGURE 6**  
**Author Country HDI across Individual and All Journals**



**FIGURE 7**  
**U.S. Authorships by Institutional Carnegie Classification**





is a bit skewed. Among journals with larger groups of authors at Carnegie-classified institutions, *portal* and *PAL* stood out with higher rates of R1 authorship than the 49 percent overall average—57.0 percent and 56.3 percent respectively (see figure C-2 in appendix C). *C&UL* had the lowest rate of R1 authors at 37.6 percent. While the overall average rate of R2 authorship was just 18.7 percent, *C&RL* had the highest above-average proportion of these authors at 26.0 percent. The lowest rates of R2 authorship came from *PAL* and *CJAL* (both 0%). Although the overall average rate of authorships from Bac (Baccalaureate) institutions was 5.2 percent, this was heavily influenced by *C&UL*, 16.3 percent of whose authors are affiliated with these institutions.

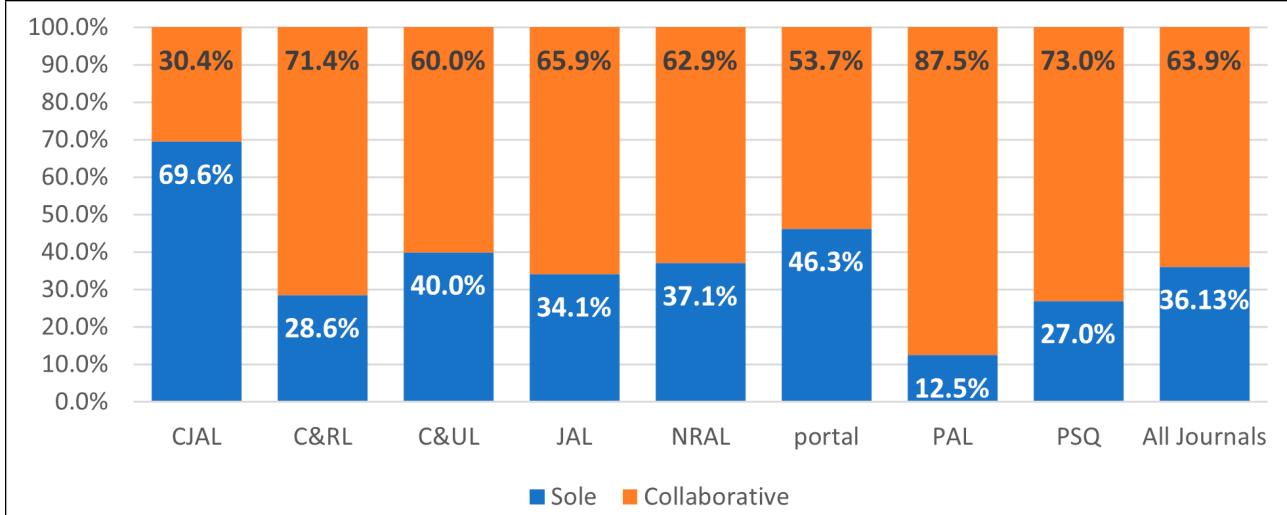
### ***Sole Versus Collaborative Authorship***

Sole authorship accounted for 36.1 percent of articles across all journals, while the remaining 63.9 percent involved collaborative authorship. Overall, collaborative authorship was more common, although *CJAL* in particular had more sole than collaborative authorship. Figure 9 breaks down sole versus collaborative authorship in each individual journal and all journals combined.

Looking specifically at first authorship in collaboration, that is, which author appears first in the byline, the top five countries remained identical to those with the most total authorships. The United States still led with 66.7 percent of the total 732 first authorships. United Kingdom had 5.1 percent, Canada had 4.8 percent, China had 3.6 percent, and Australia had 2.6 percent. Another forty-five countries accounted for the remaining 17.3 percent of first authorships, each individually representing 1.9 percent or less of authorships (ranging from 1.9% to 0.1% each).

Dual authorship was very close in popularity to sole authorship, with 377 two-author papers compared to 414 sole-author papers. Two-author collaborations accounted for 51.5 percent of all 732 collaborative articles. Another 29.2 percent of collaborations had three authors; no papers had more than nine authors (see figure 10).

**FIGURE 9**  
**Sole versus Collaborative Authorship**

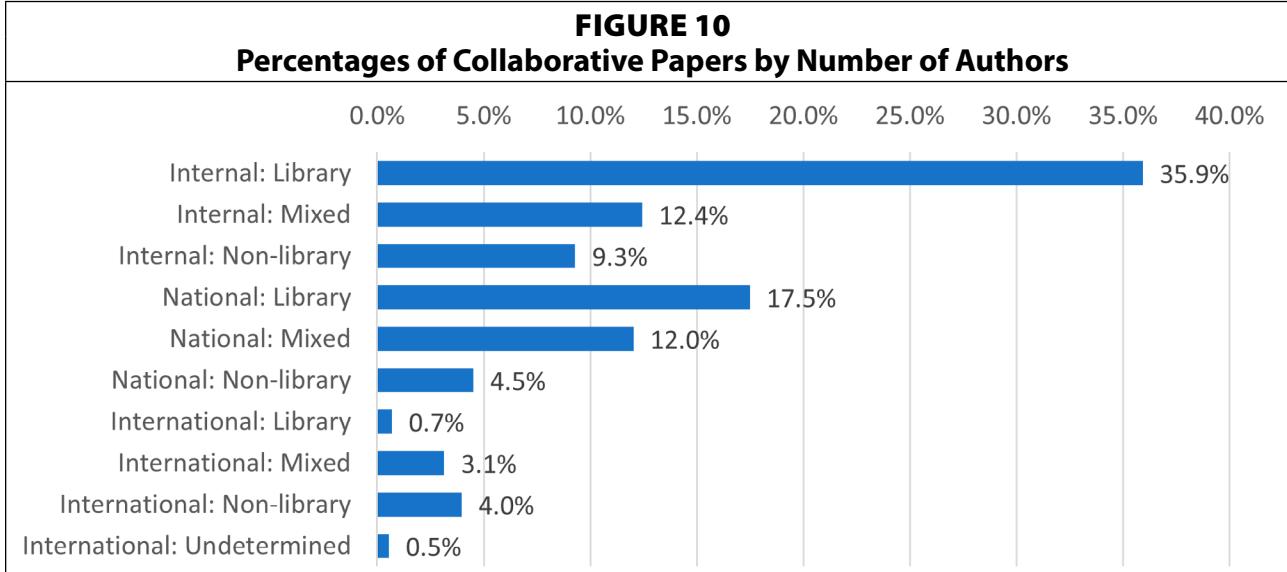


### *Collaborations*

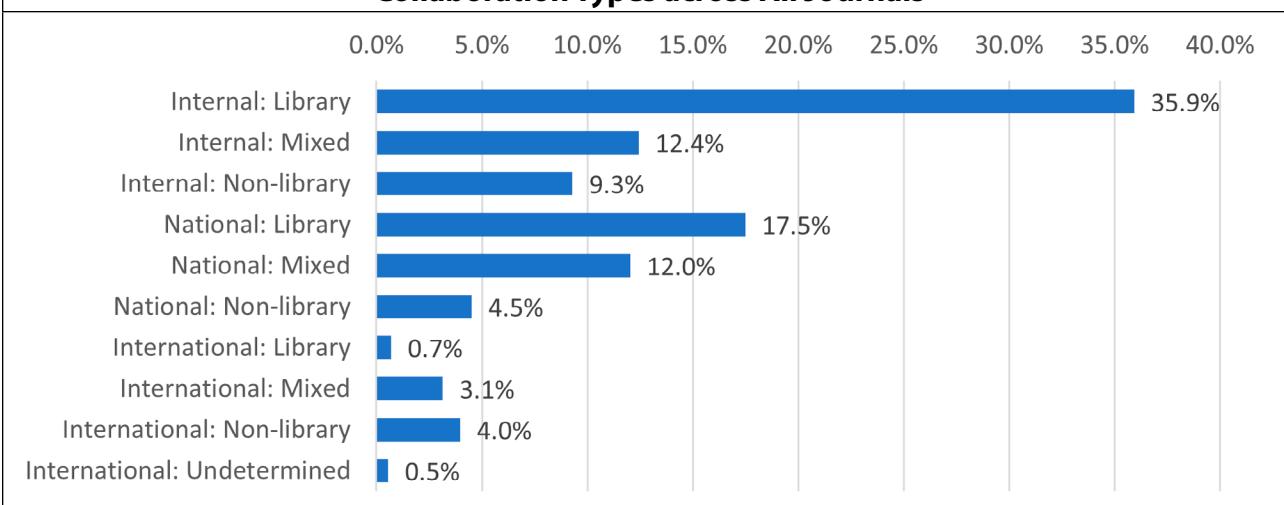
All collaborations were coded as a combination of Internal, National, or International and Library, Non-Library, or Mixed, as detailed in Table 3. These types of collaboration manifested themselves differently across the eight journals evaluated.

Across all journals, Internal: Library was the most common type of collaboration (35.9 percent), meaning most collaborations happened among academic library employees at the same institution (see figure 11). Collaborations between academic library employees in the same country, coded as National: Library, were the second most common (17.5%). In third place (12.4%) were collaborations within the same institution including at least one academic library employee and one non-library employee, which were coded as Internal: Mixed; the category National: Mixed was not far behind at 12.0 percent. The rarest kind of collaboration (not counting those of “undetermined” type) was International: Library (0.7%). Additional graphs are included in the appendix to show this breakdown in each journal.

**FIGURE 10**  
**Percentages of Collaborative Papers by Number of Authors**



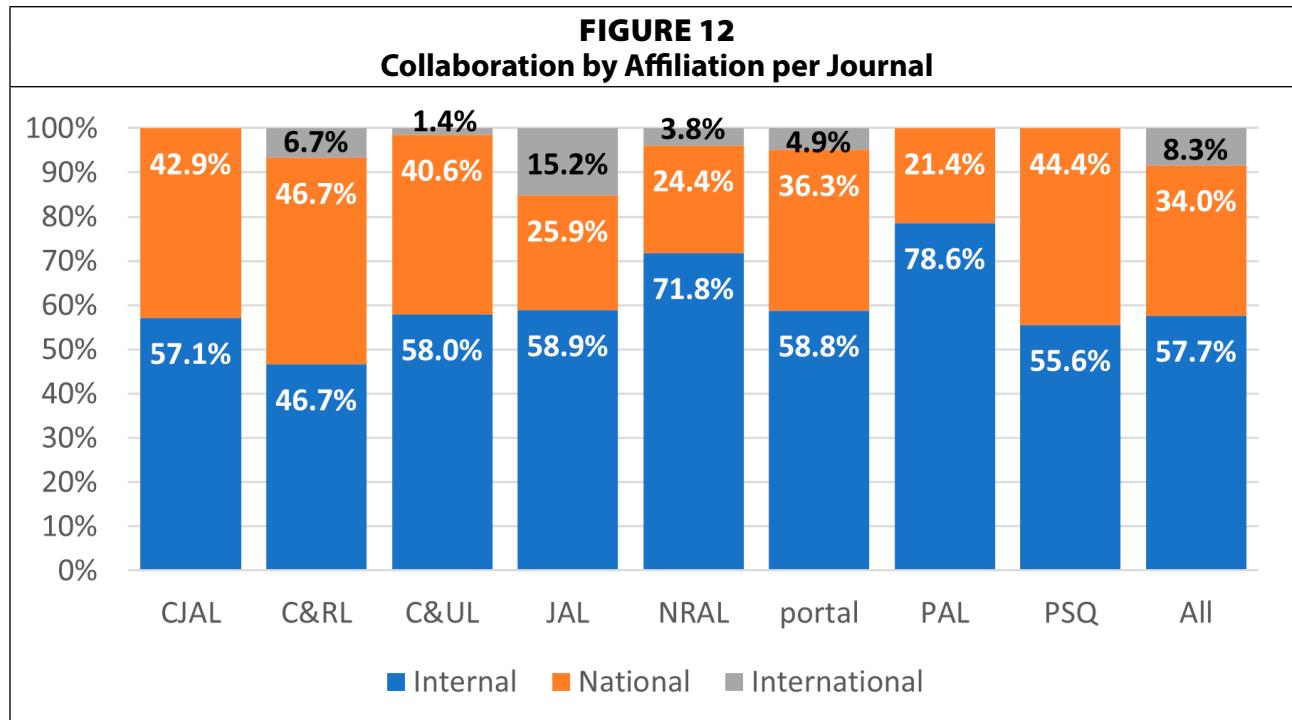
**FIGURE 11**  
**Collaboration Types across All Journals**



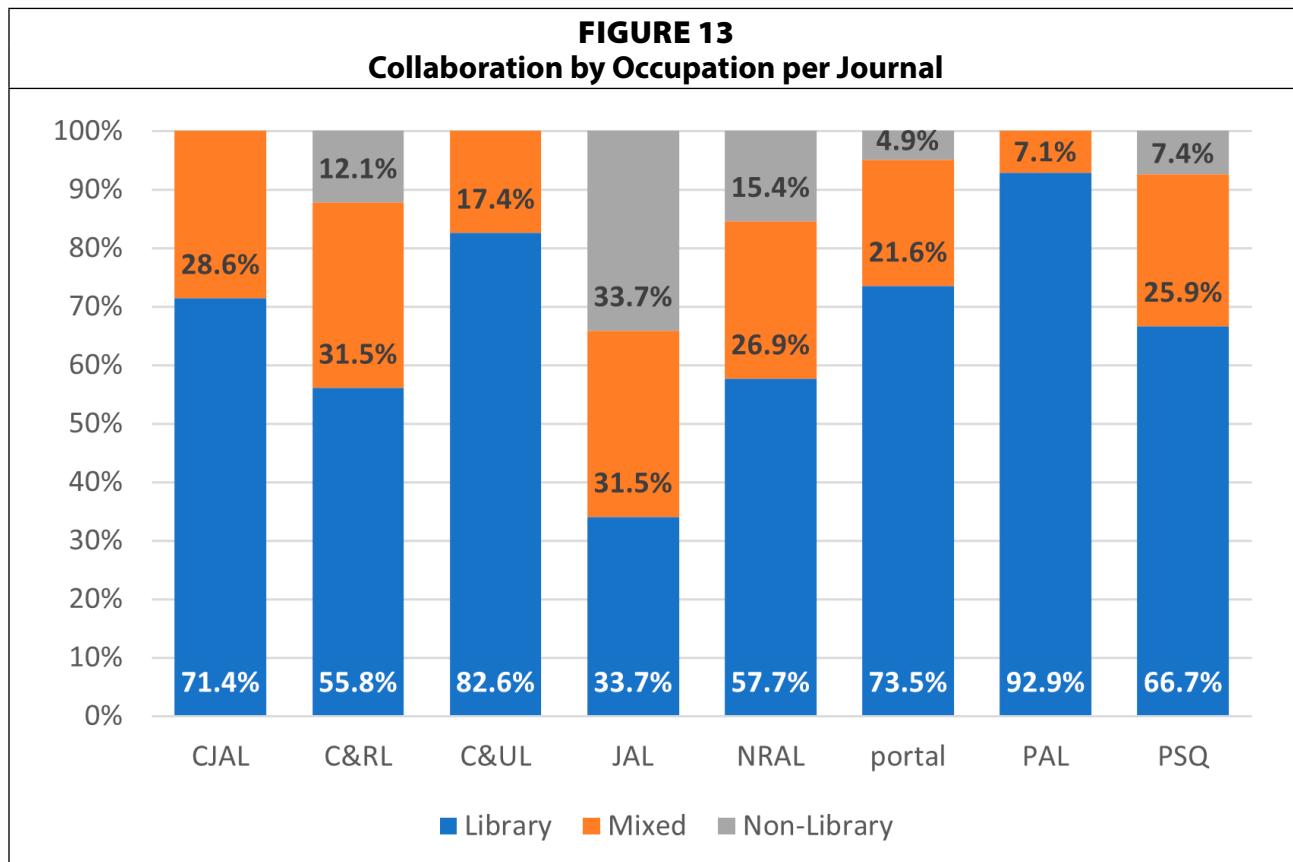
These combined codes can also be broken apart to analyze collaborator affiliations and occupations separately. *CJAL* contained only seven collaborative pieces total, and over half of those (4, or 57.1%) were internal collaborations within one institution. *CJAL*, *PAL*, and *PSQ* lacked international collaborations entirely, while *C&UL* published only one and *NRAL* published only three. Figure 12 illustrates different collaborator affiliations represented by collaborations in each journal.

Out of the total 732 collaborative articles, 385 (54.1%) involved only collaborators employed in academic libraries. Another 202 (27.6%) represented mixtures of academic library employees and others from outside academic libraries, while 130 (17.8%) included only collaborators that worked outside of academic libraries. The final four collaborations (0.5%) were Undetermined in this respect.

**FIGURE 12**  
**Collaboration by Affiliation per Journal**



*PAL* represented the greatest number of library-only collaborations (92.9%) and contained zero collaborations from only non-library authors; *C&UL* was similarly positioned, with 82.6 percent library-only collaborations and zero non-library collaborations (see figure 13). Meanwhile *JAL* included the lowest proportion of library-only collaborations (33.7%) and by far the greatest number of papers with no library authors (33.7%). Note that the emphasis in this breakdown was on current, applied experience via employment in the academic library; LIS professors were categorized as *non-library* in this context, along with researchers in other fields and non-academics, so that category should not be understood as entirely lacking in knowledge or expertise pertaining to academic libraries.



## Discussion

In studying these findings, a number of themes emerge that are worth closer consideration for ensuring equitable access to the publishing process and diverse outputs in scholarly publishing on academic librarianship.

### *Author Occupations*

As might be expected, the highest proportion of authors (70.2%, more than two-thirds) were employed in academic libraries. This almost seems like an improvement on the study by Weller, Hurd, and Wiberly, which found that only 43.6 percent of authors were academic librarians; however, it is difficult to compare precisely, since their study surveyed thirty-two journals of librarianship, which may have represented a broader librarian constituency beyond academia, and additionally they may have employed different methods in coding for *librarian*, while the current study more broadly recognized *academic library employees* who

might have been outside an MLIS librarian position.<sup>58</sup> The current study's findings closely parallel Terry's finding of over 70 percent academic library practitioner authors in *C&RL* from 1989 to 1994.<sup>59</sup>

On the other hand, the author did not expect that more than one-quarter of all authors (27.1%) would be employed outside of academic libraries. The thread of professional practice or practical application characterizes the mission and scope of six out of the eight selected journals (see table 1), and yet a noticeable portion of the scholarship being published to inform practice is coming from non-practitioners.

In terms of collaborations, little seems to have changed in recent years regarding author occupations. The current study found that a little over half of collaborative articles (54.1%) involved library-only authorship—this is similar to the findings of Luo and McKinney, who found that more than half (52%) of multiauthor papers in their sample were collaborations between librarians, and also somewhat resembles the findings of Bahr and Zemon, who found that, “for university librarians, the most common partner is another university librarian.”<sup>60</sup> However, the present study’s notation of *employment in academic libraries*, which could embrace a variety of positions and statuses, may not compare directly to Bahr and Zemon’s more specific identification of *librarians*.

The present study’s findings regarding mixed library/non-library collaborations held steady with Luo’s and McKinney’s data at a little over one quarter. Finally, the percentage of articles coauthored entirely by non-librarians was 17.8 percent, lower than the 22.8 percent found by Luo and McKinney.<sup>61</sup> However, Luo and McKinney examined only *JAL*, while the present study compared multiple journals in academic librarianship. If the present study’s findings regarding coauthorship in *JAL* only are compared to Luo’s and McKinney’s results, then the longitudinal shift becomes more starkly apparent. Now all-librarian collaborations plummet from 54.1 percent to 33.7 percent, mixed collaborations rise to 31.5 percent (compared to 27.6% across all journals), and non-librarian collaborations rise to 33.7 percent (compared to 17.8%). From this perspective, we see an even stronger indication that authors other than practitioner librarians are more regularly publishing in *JAL*, even when lacking a librarian collaborator. That being said, *JAL* admittedly has the most extreme proportions of low librarian-only and high non-library collaborations, so this trend is more exaggerated in *JAL* compared to other journals.

This raises questions about whether various fields, including academic librarianship, may be developing greater overlap in topics of interest, and whether academic librarianship journals may be seen as more accessible pathways to publishing compared to journals in related disciplines, thus possibly contributing to an increase of submissions from non-practitioners, whether sole or collaborating. Possibly economic factors in higher education are simultaneously sidelining research activities among practicing librarians, causing their proportion of contributions to decline. As Blecic et al. note, “academic librarians bring a unique perspective and a focus on library practice, often evidence-based, to the LIS literature. The profession needs to take notice of evidence of a decrease in contributions by practitioners.”<sup>62</sup> Admittedly, many of the non-practitioners represented in this case are library and information science educators, rather than members of wholly separate fields. They are not necessarily ignorant of library practice. But these trends nevertheless raise some questions as to whether the experience and perspective of active practitioners is being marginalized, at least within the arena of scholarly journals. At the same time, other options for communication channels do exist, including blogs and social media; we might also ask whether active practitioners are favoring these alternate

channels for sharing their insights and experiences, particularly if they are employed in positions that do not require scholarly publishing.

### ***National Affiliations***

The data show that the United States led in first authorships. However, first position in the byline does not always indicate a leadership position in the research or a correspondence responsibility for the publication. There are many reasons why a team may decide to order names in the byline in a particular way. Thus, although we may observe that U.S. authors dominate the first spot in bylines, this cannot be correlated to more frequent “leadership” in research, and it likely reflects only the relative quantity—and perhaps relative privilege—of U.S. authors.

Ultimately, this dataset represents authors from only 56 countries—for comparison, the United Nations recognizes 195 countries as members or permanent observers.<sup>63</sup> National affiliations across all journals reflected a disproportionate number of authors from Western, English-speaking, and majority white nations historically connected to the British Empire: the United States, the United Kingdom, Canada, and Australia. This validates findings from Kozlowska and Scoulas, who reported that international collaborators in their data sample were predominately English-speaking.<sup>64</sup> This also squares with the data shared by Hathcock to demonstrate that “publishing priority is given to the work of North American and European researchers.”<sup>65</sup> Furthermore, the present study found that 91.2 percent of all collaborators and 78.3 percent of international collaborators came from countries with Very High HDI, further validating Kozlowska and Scoulas, who reported 70 percent of international collaborators came from Very High HDI countries.<sup>66</sup>

China (ranked High HDI as opposed to Very High) also managed to break into the top ranks alongside higher HDI, predominately English-speaking Western nations, but perhaps this should be unsurprising. At the national level, China has placed significant emphasis on, and funding towards, becoming a competitive research powerhouse; a 2020 report from the National Science Board shows that China alone accounted for almost one-third (32%) of the global increase in research and development (R&D) between 2000 and 2017, and their national R&D spending in 2017 exceeded that of the entire European Union.<sup>67</sup>

A central question that emerges is *why* more authorships are not represented from more countries. Do academic librarians in those nations face less professional and institutional pressure to publish research? Are they simply targeting different journals—perhaps published within their nation or language, or scoped more narrowly to focus on specific areas of librarianship (reference, electronic resources, etc.)? Are they engaging with more informal channels of communication, like blogs? Or are they facing barriers that limit their publishing in leading academic librarianship journals—and, if so, what are those barriers: language, financial support, implicit bias of reviewers? Future research could investigate these issues so that these journals can ensure they are maximizing the diversity of experience they represent. As Lettie Conrad stated in an interview with *The Scholarly Kitchen*, “diversity is only possible if we operate outside our comfort zones, to include disparate voices of scholars without competitive English proficiency, welcome insights from all ages, races, genders, etc.”<sup>68</sup>

### ***Carnegie Classifications***

The 3.0 percent of institutions in the U.S. classified as R1 generated nearly half of the authorship in U.S. academic librarianship journals, while the fully three-quarters of U.S. institutions

classified as Baccalaureate, Associate's, Special Focus, or Tribal contributed only 8.7 percent of authorship. Authorship by Carnegie Classification was not significantly different between OA and subscription journals. This suggests that decisions to publish in open versus paywalled journals are not necessarily a matter of institutional resources or values.

The overwhelming dominance of R1 institutions in the authorship pool is not necessarily unexpected. R1 institutions generally place greater emphasis on research production for all faculty, so if librarians at that institution have faculty status, they are likely to face greater pressure to publish for tenure and promotion compared to institutions in other classifications where greater emphasis is placed on teaching. Library authors at R1 institutions are also likely to have access to more numerous and more robust research support services simply because of the R1 focus, and they may find greater opportunity to collaborate on publishing with faculty in other disciplines. Conversely, librarians at institutions focused on baccalaureate and associate's degrees may lack resources and may face little encouragement or incentive to publish—or sometimes may be actively discouraged from doing so—since that is not their institution's priority.

Such an imbalance might almost make sense in a theoretical or purely scholarly discipline, where R1 scholars primarily write to and for one another. But in a profession such as librarianship, characterized by a large practitioner audience seeking to benefit from practical, applied research, it seems unconstructive that such a small, elite, and highly resourced population would produce so much of the literature meant to inform the remaining mass of practitioners who are operating in drastically different settings. The imbalance in authorship might be due only to the fact that librarians at less research-focused institutions neither need nor care to publish or choose to do so only via less formal channels such as blogs. Conversely, it might be the case that some voices who wish to be heard lack the resources to convey their experience. If academic librarianship journals overemphasize the R1 perspective without striving for more balanced inclusion, they could risk isolating the practitioner readers at other types of institutions and creating a conversation that is not relevant or generalizable to a broader audience.

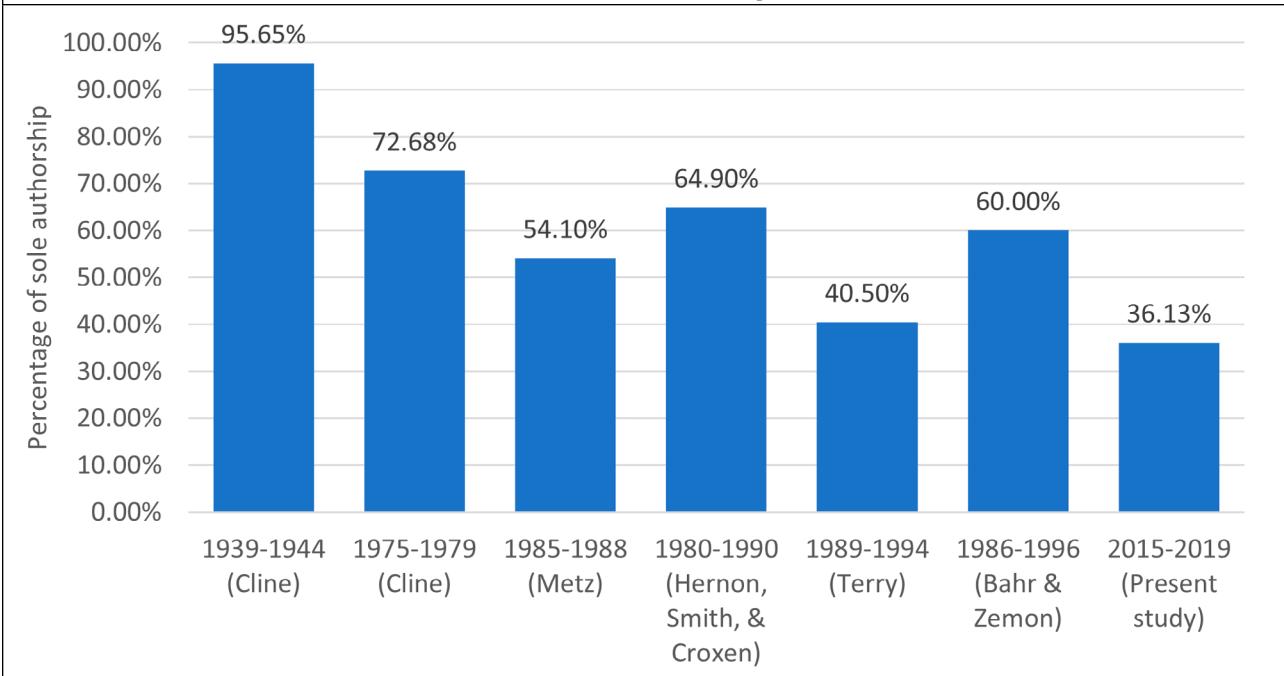
### ***Sole Versus Collaborative Authorship***

Previous literature has shown fluctuating but ultimately declining rates of sole authorship in academic librarian scholarship, and the findings of the present study further confirm that trend. Since more data is available for *C&RL* compared to the other journals studied, *C&RL* has been used as an example to illustrate changes in sole authorship over time (see figure 14).

In addition to the increase in the number of collaborations, the number of authors within each collaboration has also generally increased. Looking at articles from 1986 to 1996, Zemon and Bahr found that 72 percent of collaborations in *C&RL* and 78 percent of collaborations in *JAL* comprise just two authors.<sup>69</sup> The present study found that only 44.8 percent of collaborations in *C&RL* and 50.7 percent of collaborations in *JAL* had two authors; meanwhile, three-author studies accounted for close to the same amount, 37.0 percent, of collaborative articles in *C&RL* (see figure 15). Although this study did not survey motives, this suggests that some reasons for collaboration—possibly division of labor, risk aversion, or others—are encouraging authorship teams in academic librarianship to expand in size.

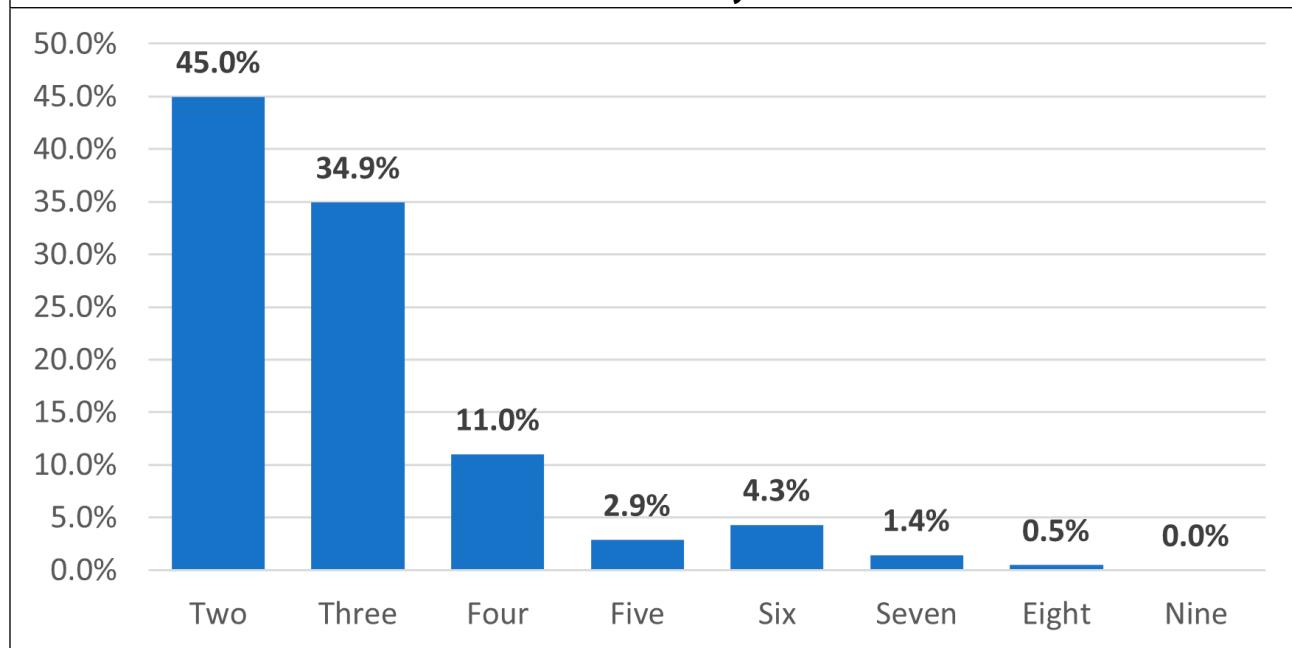
We could perhaps assume that these increases in frequency and size of collaborative authorship would lead to greater diversity in the voices in the scholarship of academic librarianship—more individual authors are represented compared to sole authorship, and some

**FIGURE 14**  
**Trends in Sole Authorship in C&RL**



individuals may be able to achieve publication as part of a team in a way that they could not access research support or scholarly publications mechanisms on their own. However, a concern also exists that some “powerhouse” institutions and individuals submitting larger numbers of team-sourced articles may actually flood the market and limit publishing access by less resourced individuals. Ultimately, the findings of the present study cannot reach conclusions on this point, but it raises questions worth addressing in future research.

**FIGURE 15**  
**Collaborative Articles in C&RL by Number of Authors**



### ***Institutional, National, and International Collaborations***

Norelli and Harper found that coauthors came from the same institution in 62.2 percent of collaborations in their sample.<sup>70</sup> The present study found 57.7 percent of collaborative articles were institutional. That decline in single-institution collaborations suggests that interinstitutional collaboration may be on the rise in academic librarianship research. If that is true, the shift is likely related to many of the same pressures behind the increase in collaboration overall, as cited in the literature review, including changes in funding patterns, seeking greater visibility, and technology that simplifies collaboration at a distance.

Nevertheless, Library: Internal was still the most common of all collaboration types, even if less so than in the past. Internal collaborations were far more likely to be conducted among only academic library practitioners, which is unsurprising since such collaborations would be facilitated by the researchers' proximity, familiarity, and shared goals (in terms of departmental performance requirements, tenure requirements, or the like). These collaborations also require fewer extra steps in terms of sharing resources, datasets, approval by institutional review boards, and so forth, and may be easier to manage without external funding. The second most common form of collaboration was National: Library, suggesting that it is easier or somehow preferable for academic library practitioners to connect with library peers at other institutions, compared to collaborators in other fields even at their own institutions. However, International: Library was the least common of all collaboration types, suggesting that academic librarian practitioners have more difficulty connecting with library peers in other countries. Attending conferences and participating in professional associations is generally less expensive at the national versus international level, thus introducing national peers to one another more easily than international peers. However, given the technology available for video conferencing, file sharing, and collaborative research in general, geographical boundaries in many ways do not restrict international collaboration to the extent that they have in the past. Nevertheless, language barriers, cultural differences in how research is pursued, research requirements for librarians, or other factors still appear to be holding back international collaboration among academic library authors.

Opportunities exist for creating infrastructure to facilitate research collaboration internationally—this author echoes Dr. Zainab Yunusa-Kaltungo's call for "creating platforms for mentoring and collaboration between Northern and Southern researchers."<sup>71</sup> Two relevant existing initiatives to consider are R Voice and The Librarian Parlor. R Voice is a social-media-like (it actually grew out of a Facebook group) networking and discussion platform operated by Editage, where researchers from across disciplines and around the world can connect, ask questions, and share their advice.<sup>72</sup> The Librarian Parlor is a space in which to converse, ask questions, and share expertise specifically about library research. The Classifieds area of The Librarian Parlor provides mechanisms explicitly intended for researchers to seek collaborators, either for a conceptualized project or around broad, shared interests.<sup>73</sup> The models from these types of initiatives could be combined with technological enhancements, such as automated language translation and the gamification of central goals—for instance, earning badges for networking and forming collaborations with peers outside an individual's country, region, or language, with peers from a low HDI nation, or the like. In this way, one could create a robust platform that both enables and incentivizes library practitioner-researchers to mentor, learn, and network while also deliberately creating and cultivating research collaborations in a consciously diverse, international, and multilingual way. As Dr. Haseeb Md Irfanullah observes "research funding agencies could play an important role...by promoting such diversity in the authorship

of journal papers,” and so perhaps funding opportunities from ALA, ACRL, IMLS, and similar organizations could facilitate the creation of such tools for academic library researchers.<sup>74</sup>

## Limitations and Further Research

The foremost limitation of this study was that external collaboration can be difficult to gauge accurately, in the sense that an individual’s current affiliation cannot represent the diversity of their past relationships. Though coauthors were affiliated with different countries and/or institutions at the time that an article was proofed and bylines were finalized, they may have shared an affiliation earlier in the project collaboration or prior to it. This complexity cannot be captured in the journal publication dataset, which necessarily reflects a snapshot of affiliations at one moment in time. Additionally, journal practices and author preferences varied in terms of documenting each author’s institutional affiliation. While most authors listed something in terms of affiliation, it was sometimes only a post office box or an email address, with no institution or country discernible. Finally, the dataset represented only five years of publication, and it is possible that a larger dataset might have revealed more subtle trends.

As discussed above, future research should delve deeper into the comparatively low participation in these journal venues by international authors and librarians at non-doctoral institutions, perhaps first examining demographic data from submissions to identify whether the breakdown in diversity is occurring before or after submission; data would need to be anonymized to protect author privacy, yet details such as national affiliation and institution would be needed for analysis, so it is unclear whether journals would be willing or able to provide such a dataset. Additional research opportunities could include surveying academic library practitioners about their motivations to publish or not publish; interviewing underrepresented academic librarians about their experiences with and attitudes towards mainstream journals; and exploring how active practitioners may be sharing their valuable perspectives through alternate channels outside of scholarly publishing.

## Conclusions

Taken altogether, the findings of this study as represented in eight journals paint a picture of recent trends in authorship in academic librarianship: significant increases in multiauthor papers as well as quantity of authors per collaboration, but also an increase in authors who are not academic library practitioners, and relatively few publications originating from outside doctoral universities and English-speaking Western nations. It is well understood that the field of academic librarianship faces challenges of limited diversity among its practitioners, and that diversity becomes even more limited when it is filtered through the barriers already present in scholarly communication systems. As existing initiatives from the Association of Research Libraries, the Association of American University Presses, and others work to increase diversity among practicing librarians and diversity in scholarly publishing, we must ensure that the scholarly journals which reflect the philosophies, workflows, and creativity of academic librarianship find more ways to ensure that they inclusively reflect a diverse global perspective beneficial to all researchers and practitioners.

## Acknowledgements

I would like to gratefully acknowledge Danny Saheb for his assistance in looking up and compiling institutional Carnegie Classifications for this study’s dataset.

**Data Availability**

The dataset generated and analyzed during the current study is available in the Scholarly Works @ SHSU institutional repository at <https://shsu-ir.tdl.org/handle/20.500.11875/3601>.

## Appendix A – Additional Tables Pertaining to Coding

**TABLE A-1**  
**Additional Rules Governing the Coding of Collaborations**

Condition	Rule	Coding	Example
A coauthor lists multiple institutional affiliations, and one of those affiliations is shared with the other coauthors	Shared institution takes precedent	Internal	Author A is a student at University I and an employee at University II, while all other coauthors are employees at University I. In this case, the shared University I affiliation would be preferred, and the collaboration would be classified as Internal.
A coauthor lists multiple institutional affiliations that span international borders, but one country is shared with the other coauthors	Shared country takes precedent	National	Author A is affiliated with universities in both the United States and Spain. Author B is affiliated with a different university in Spain. The shared national affiliation with Spain would be preferred, and the collaboration would be classified as National.
Coauthors have affiliations with different libraries within a single campus	Campus affiliation takes precedence over individual library affiliation	Internal	Author A works at the main library and Author B works at the health sciences library, both at University Campus I. The collaboration would be classified as Internal.
Coauthors have affiliations within the same university system but on different campuses	Campus affiliation takes precedent over system affiliation	National	Author A works at the library of University I—City α campus, and Author B works at the library of University I—City β campus. The collaboration would be classified as National.
A coauthor's affiliation indicates retirement, and they are retired from the same institution of other coauthor affiliations	Previous affiliation takes precedent over retiree status	Internal	Author A and Author B work at University I. Author C is retired, but was formerly affiliated with University I. The collaboration would be classified as Internal.

**TABLE A-2**  
**Additional Rules Governing the Coding of Occupations**

Condition	Rule	Coding
An author is both an employee in an academic library and also lists a non-library role (e.g., student in a graduate program outside of library science; adjunct instructor in a library science graduate program)	Library practitioner role takes precedent over other roles	LA
An author lists both current position and previous position at time of writing	Role at time of writing takes precedence over current role	Depends on role
An author is clearly employed in higher education, but library versus non-library cannot be determined even after searching	Academic but non-library role is assumed	A
An author is employed in a research capacity, but outside an institution of higher education (e.g., an independent research center or non-profit agency)	Role classified as Non-academic in this context	NA

**TABLE A-3**  
**Carnegie Basic Classifications and Abbreviations for This Paper**

Basic Classification	Abbreviation	Code
R1: Doctoral Universities—Very high research activity	R1	1
R2: Doctoral Universities—High research activity	R2	2
D/PU: Doctoral/Professional Universities	D/PU	3
M1: Master's Colleges and Universities—Larger programs	M1	4
M2: Master's Colleges and Universities—Medium programs	M2	5
M3: Master's Colleges and Universities—Smaller programs	M3	6
Baccalaureate Colleges	Bac	7
• Baccalaureate Colleges: Arts & Sciences Focus		
• Baccalaureate Colleges: Diverse Fields		
Baccalaureate/Associate's Colleges	Bac/Assoc	8
• Baccalaureate/Associate's Colleges: Mixed Baccalaureate/Associate's Colleges		
• Baccalaureate/Associate's Colleges: Associate's Dominant		
Associate's Colleges	Assoc	9
• Associate's Colleges: High Transfer-High Traditional		
• Associate's Colleges: High Transfer-Mixed Traditional/Nontraditional		
• Associate's Colleges: High Transfer-High Nontraditional		
• Associate's Colleges: Mixed Transfer/Career & Technical-High Traditional		
• Associate's Colleges: Mixed Transfer/Career & Technical-Mixed Traditional/Nontraditional		
• Associate's Colleges: Mixed Transfer/Career & Technical-High Nontraditional		
• Associate's Colleges: High Career & Technical-High Traditional		
• Associate's Colleges: High Career & Technical-Mixed Traditional/Nontraditional		
• Associate's Colleges: High Career & Technical-High Nontraditional		
Special Focus Two-Year	Special (2yr)	10 (no records)
• Special Focus Two-Year: Health Professions		
• Special Focus Two-Year: Technical Professions		
• Special Focus Two-Year: Arts & Design		
• Special Focus Two-Year: Other Fields		

**TABLE A-3**  
**Carnegie Basic Classifications and Abbreviations for This Paper**

<b>Basic Classification</b>	<b>Abbreviation</b>	<b>Code</b>
Special Focus Four-Year • Special Focus Four-Year: Faith-Related Institutions • Special Focus Four-Year: Medical Schools & Centers • Special Focus Four-Year: Other Health Professions Schools • Special Focus Four-Year: Engineering Schools • Special Focus Four-Year: Other Technology-Related Schools • Special Focus Four-Year: Business & Management Schools • Special Focus Four-Year: Arts, Music & Design Schools • Special Focus Four-Year: Law Schools • Special Focus Four-Year: Other Special Focus Institutions	Special (4yr)	11
Tribal Colleges	Tribal	12 (no records)

## Appendix B – Author Nations Per Journal

<b>CJAL</b>	<b>Count</b>	<b>Percent</b>
Canada	22	73.3
United States	8	26.7

<b>C&amp;RL</b>	<b>Count</b>	<b>Percent</b>
United States	456	84.0
Canada	30	5.5
Australia	14	2.6
Spain	7	1.3
Japan	5	0.9
Norway	4	0.7
Iran	4	0.7
United Arab Emirates	3	0.6
The Netherlands	3	0.6
Poland	3	0.6
China	3	0.6
Brazil	2	0.4
Unknown	2	0.4
Israel	2	0.4
Hong Kong	2	0.4
New Zealand	1	0.2
South Korea	1	0.2
Kazakhstan	1	0.2

<b>C&amp;UL</b>	<b>Count</b>	<b>Percent</b>
United States	203	94.0
Australia	6	2.8
Canada	3	1.4
Kenya	2	0.9
United Arab Emirates	1	0.5
Hong Kong	1	0.5

<b>JAL</b>	<b>Count</b>	<b>Percent</b>
United States	497	54.0
China	77	8.4
Canada	37	4.0
United Kingdom	28	3.0
Australia	26	2.8
Spain	23	2.5
Hong Kong	21	2.3

Greece	19	2.1
South Africa	19	2.1
Japan	16	1.7
Malaysia	13	1.4
Belgium	11	1.2
Pakistan	8	0.9
Jordan	8	0.9
New Zealand	8	0.9
Nigeria	8	0.9
Singapore	8	0.9
Iran	7	0.8
Chile	7	0.8
Hungary	7	0.8
Slovenia	7	0.8
India	6	0.7
South Korea	5	0.5
Turkey	5	0.5
Israel	5	0.5
Croatia	4	0.4
Germany	4	0.4
Qatar	4	0.4
Republic of Korea	4	0.4
Guam	4	0.4
Zimbabwe	3	0.3
Ecuador	3	0.3
United Arab Emirates	3	0.3
Kuwait	2	0.2
Finland	2	0.2
Ukraine	2	0.2
Brazil	1	0.1
Czech Republic (Czechia)	1	0.1
Egypt	1	0.1
Fiji	1	0.1
The Netherlands	1	0.1
Serbia	1	0.1
Saudi Arabia	1	0.1
Norway	1	0.1
Ghana	1	0.1

<b>NRAL</b>	<b>Count</b>	<b>Percent</b>
United Kingdom	96	37.2
United States	64	24.8
Ireland	23	8.9
Australia	19	7.4
Canada	14	5.4
Nigeria	6	2.3
Finland	6	2.3
New Zealand	4	1.6
Botswana	4	1.6
Ghana	4	1.6
Austria	3	1.2
The Netherlands	3	1.2
Pakistan	3	1.2
Sweden	2	0.8
Spain	2	0.8
Hong Kong	1	0.4
Kuwait	1	0.4
South Africa	1	0.4
United Arab Emirates	1	0.4
Japan	1	0.4

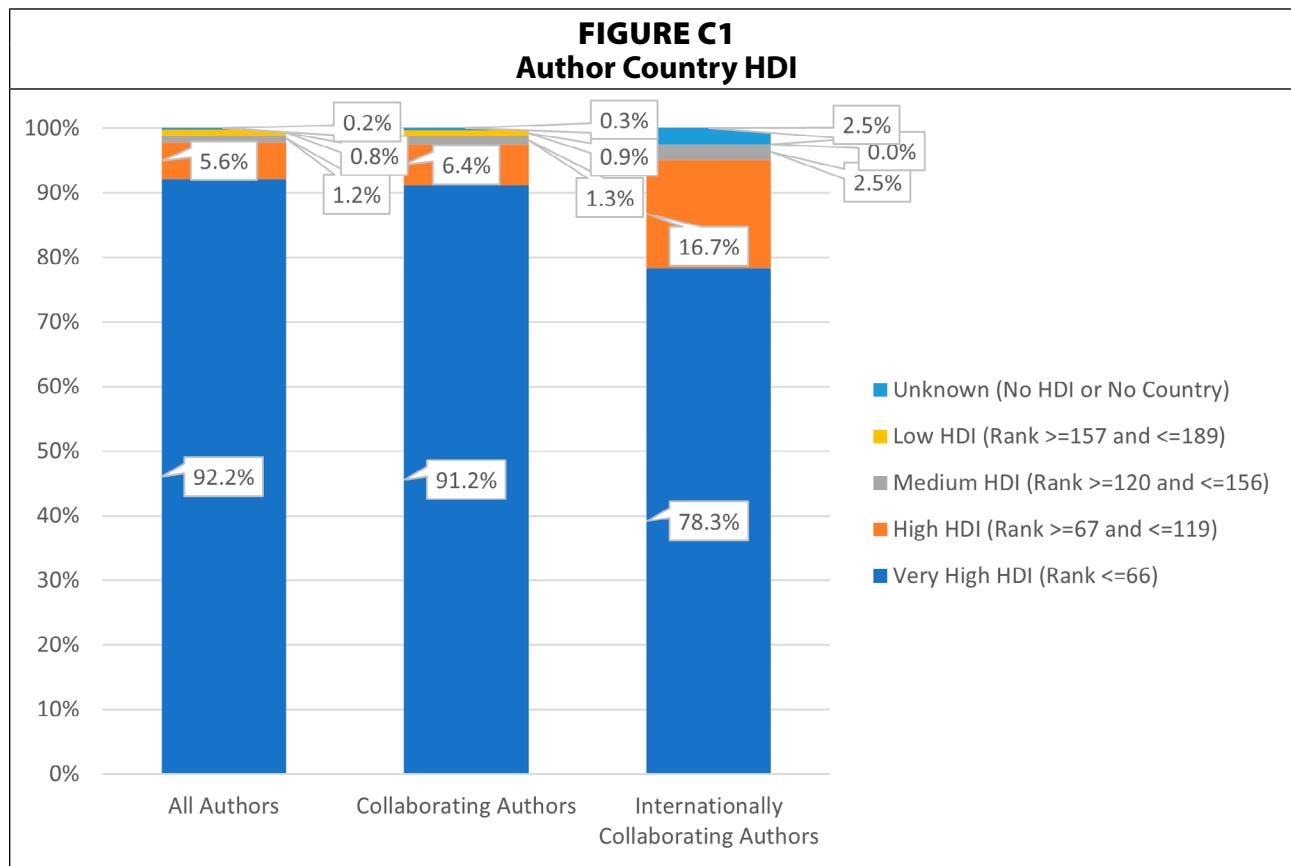
<b>PAL</b>	<b>Count</b>	<b>Percent</b>
United States	32	84.2
Canada	6	15.8

<b>portal</b>	<b>Count</b>	<b>Percent</b>
United States	324	83.9
Spain	13	3.4
Canada	11	2.8
Nigeria	6	1.6
Chile	6	1.6
United Kingdom	5	1.3
Norway	4	1.0
Russia	3	0.8
Vietnam	2	0.5
Ireland	2	0.5
Sri Lanka	2	0.5
Pakistan	2	0.5
Poland	1	0.3
Australia	1	0.3
Hong Kong	1	0.3
Germany	1	0.3
China	1	0.3
South Africa	1	0.3

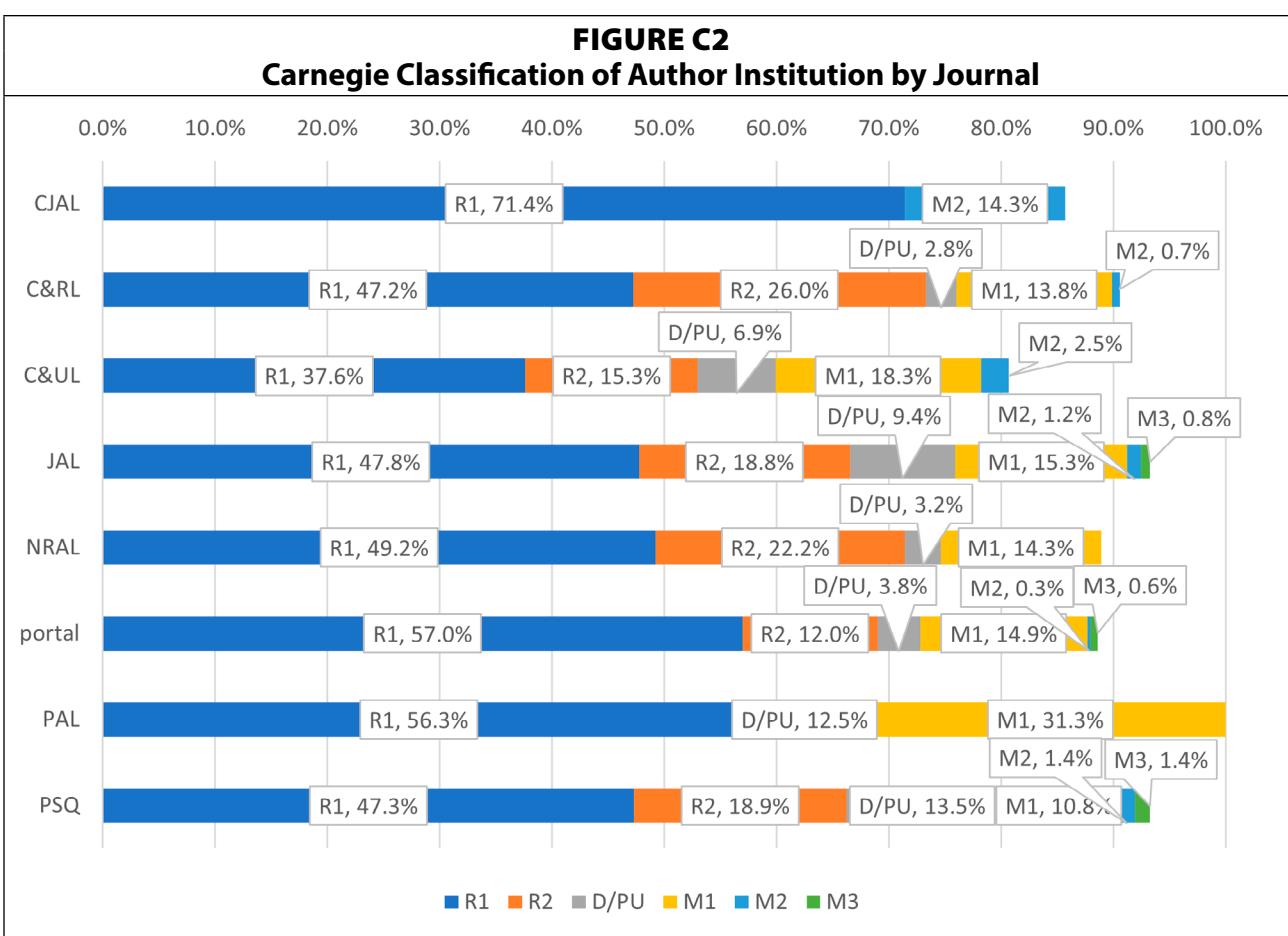
  

<b>PSQ</b>	<b>Count</b>	<b>Percent</b>
United States	78	96.3
Canada	3	3.7

## Appendix C – Further Visualization of Authorship by HDI and Carnegie



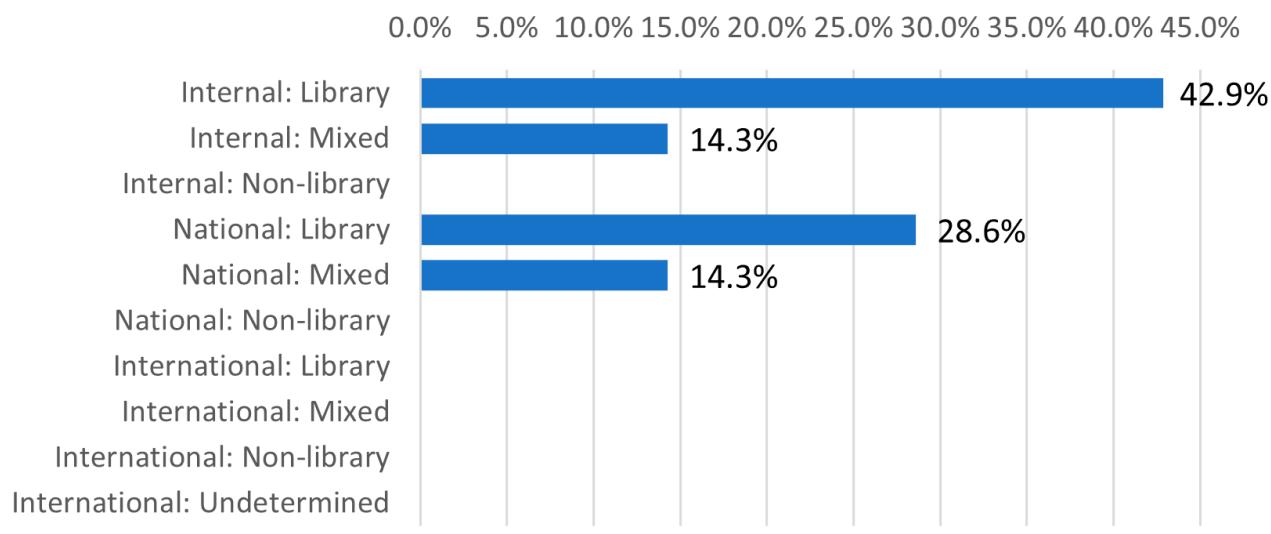
**FIGURE C2**  
**Carnegie Classification of Author Institution by Journal**



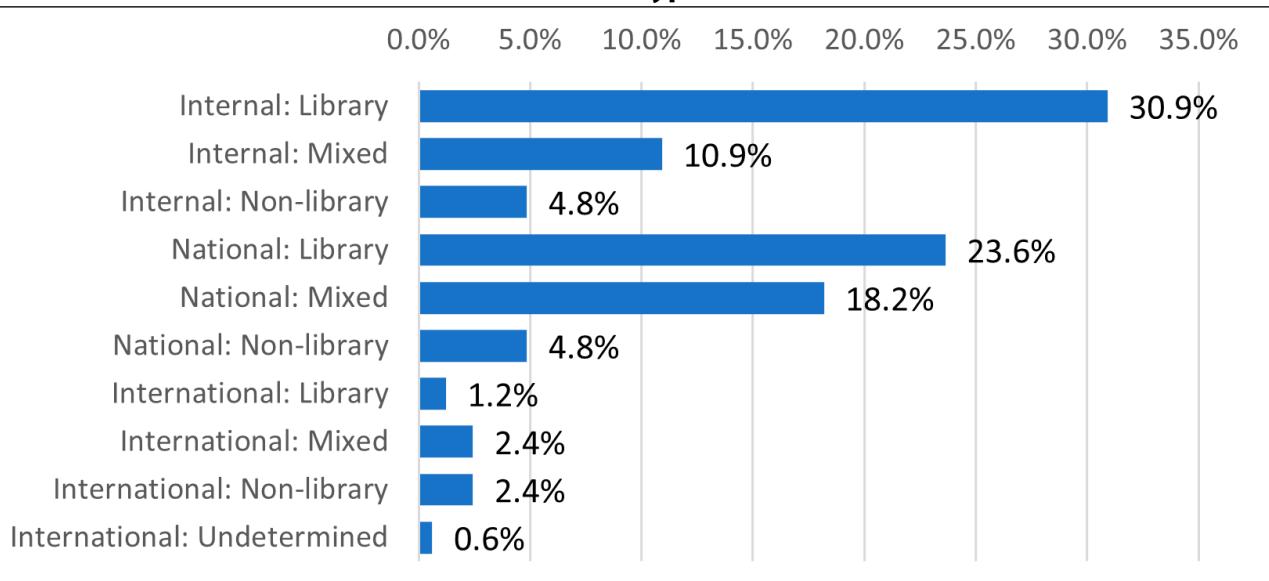
Note: To remain readable, this figure only includes doctoral-level and master-level classifications, but the gap between the end of a colored bar and the 100 percent mark on the horizontal axis illustrates how much (or how little) of that journal's authorship came from institutions with any other classifications.

## Appendix D – Collaboration Types Per Journal

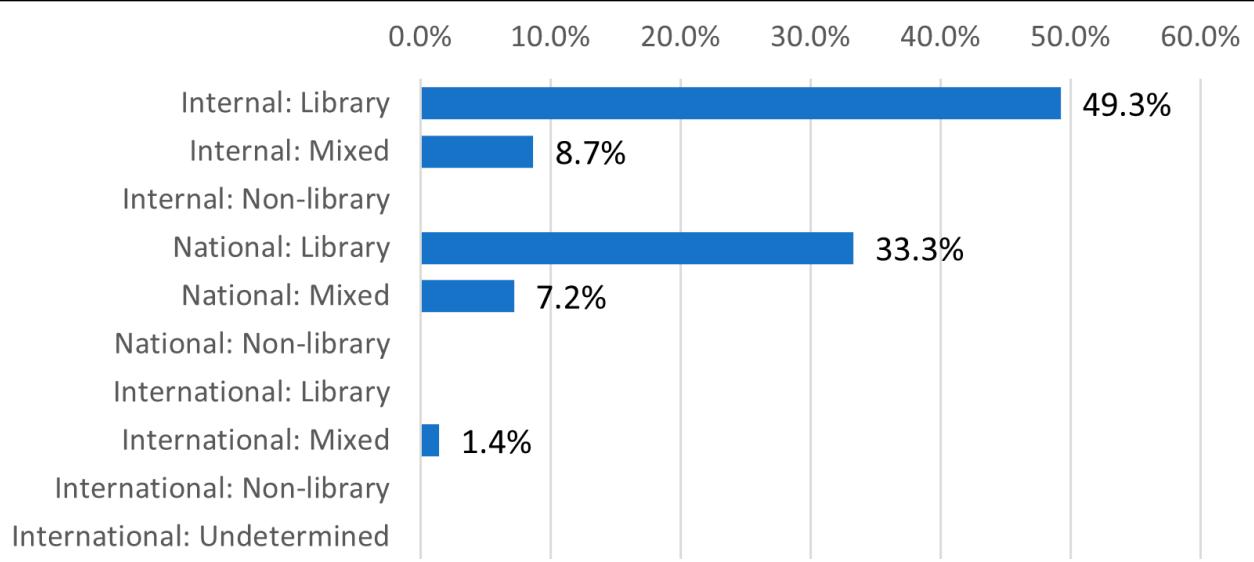
**FIGURE D1**  
**Collaboration Types in CJAL**



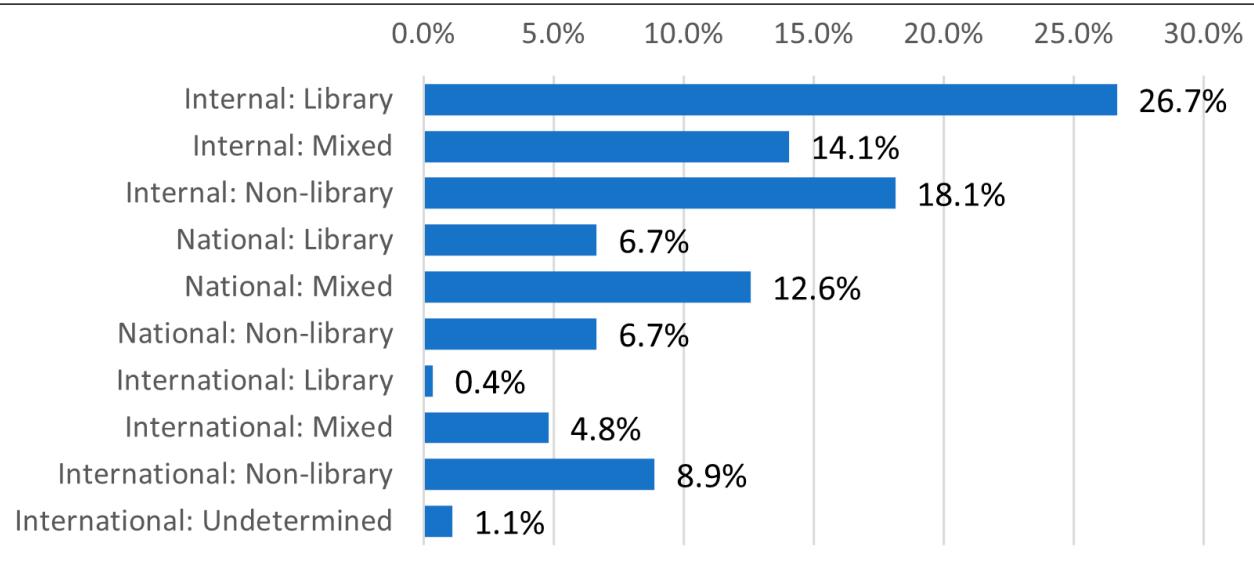
**FIGURE D2**  
**Collaboration Types in C&RL**



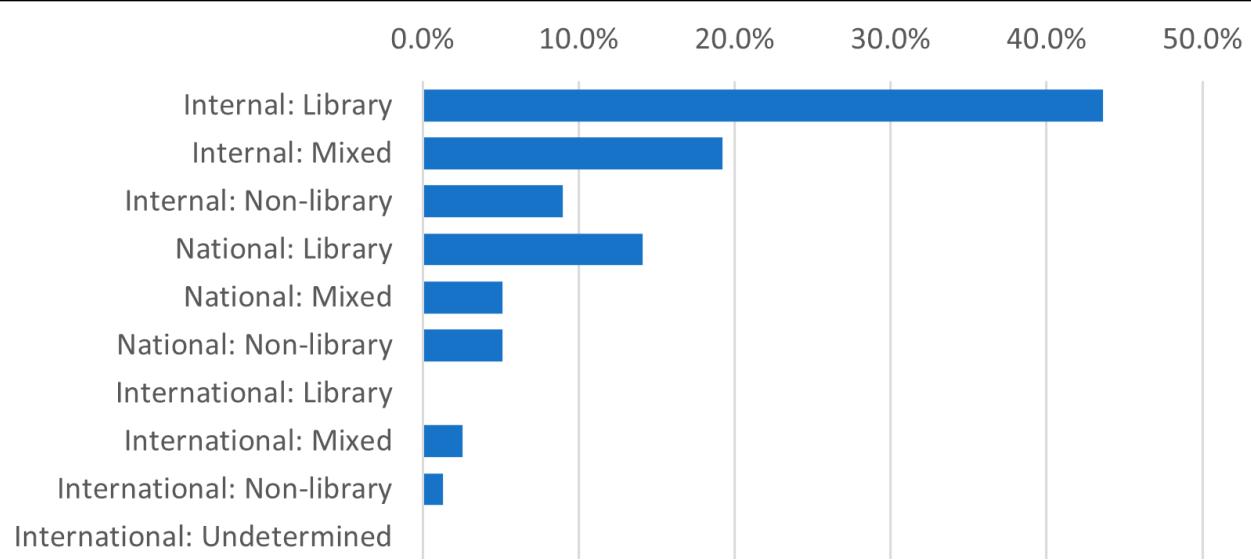
**FIGURE D3**  
**Collaboration Types in C&UL**



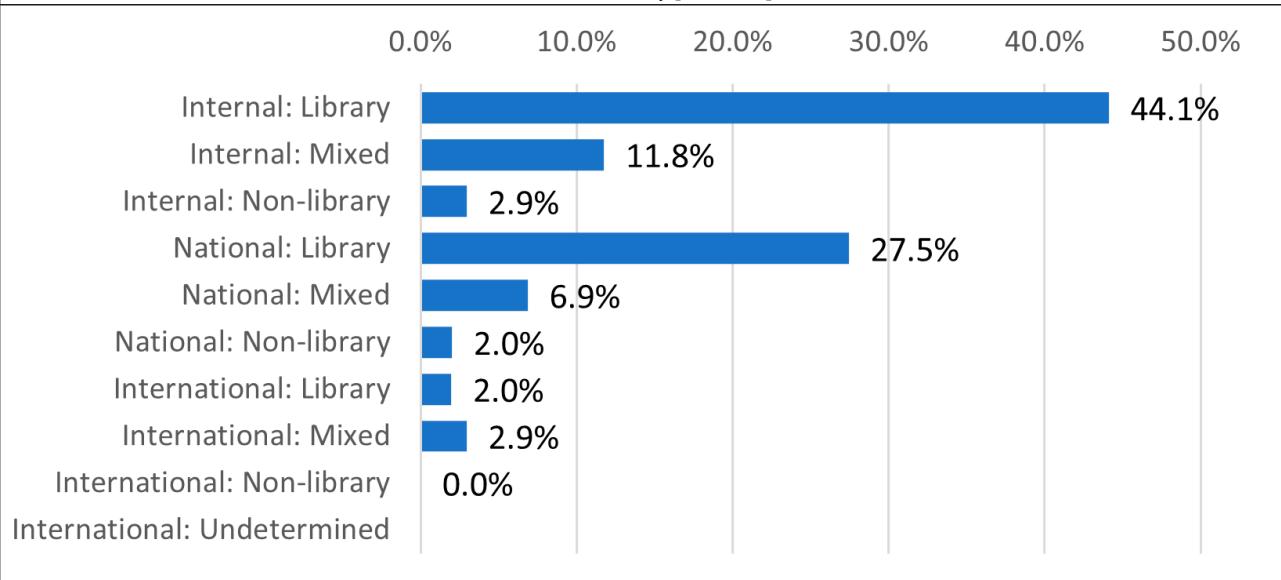
**FIGURE D4**  
**Collaboration Types in JAL**



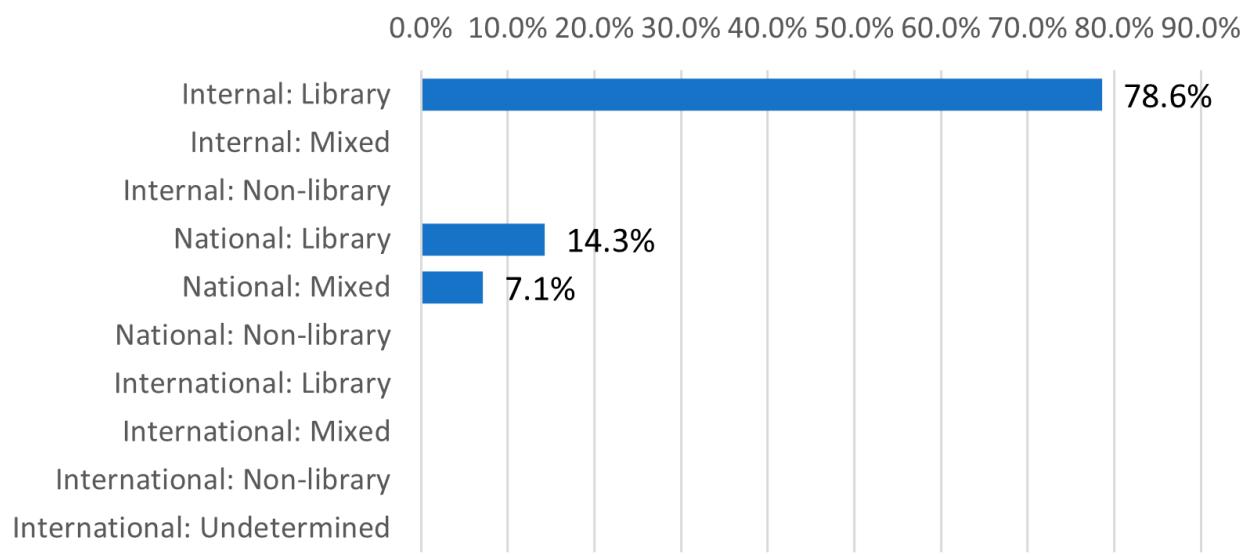
**FIGURE D5**  
**Collaboration Types in NRAL**



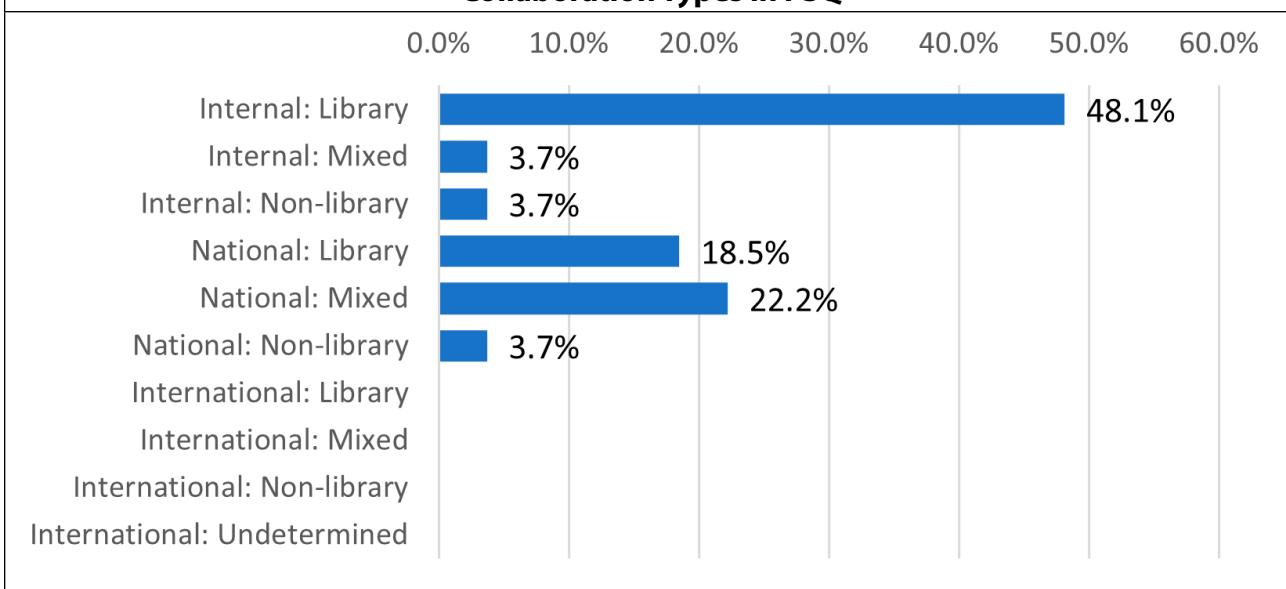
**FIGURE D6**  
**Collaboration Types in portal**



**FIGURE D7**  
**Collaboration Types in PAL**



**FIGURE D8**  
**Collaboration Types in PSQ**



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## Notes

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# The Effects of Research Data Management Services: Associating the Data Curation Lifecycle with Open Research Output

Nicolas Pares and Peter Organisciak

This study seeks to understand the relationship between research data management (RDM) services framed in the data curation life cycle and the production of open data. An electronic questionnaire was distributed to US researchers and RDM specialists, and the results were analyzed using Chi-Square tests for association. The data curation life cycle does associate with the production of open data and shareable research, but tasks like data management plans have stronger associations with the production of open data. The findings analyze the intersection of these concepts and provide insight into RDM services that facilitate the production of open data and shareable research.

## Introduction

The increase of digital services and digital content in academia and libraries, due in part to the COVID-19 pandemic and continued technological change, has shifted researchers and RDM providers toward more networked and open digital paradigms. This study evaluates the relationship between research data management (RDM) services and the production of open data and shareable research outputs, from the perspective of institutional RDM services and researchers in the United States.

A survey was administered to collect data on the relationship between RDM practices, resources, and services framed in the data curation life cycle and the researcher's abilities and beliefs in the production of open data and shareable research outputs. This study focused on the following research questions:

1. Do institutional contexts such as location of RDM services, availability of RDM services, and institutional roles affect researchers' ability and sense of importance to produce shareable and open primary research data?
2. Do institutional services framed in the stages of the Data Life Cycle affect researcher's ability and sense of importance to produce shareable and open primary research data?

In the remainder of this paper, we describe the survey design, analysis, and outcomes, our results, and the role of data management plans in supporting open data production. We also note the importance of RDM education for researcher buy-in.

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## Background

Open and shareable data has incredible value for scholarly communication and scientific growth.<sup>1</sup> When data and research can be reused for secondary research, findings are reproducible and more easily validated, major research projects spanning many years have continuity, or when researchers avoid unnecessary duplication scholarly communication advances more efficiently.<sup>2</sup> In addition, data sharing can lead to more collaboration, which makes research more beneficial to scholars.<sup>3</sup> This project studies the extent to which the availability of research data services facilitates the production of open and shareable data.

The need for open and shareable research data aligns with the public-service mission of most U.S. higher education institutions. This need is punctuated by the Open Data policies of the US government.<sup>4</sup> The Committee on Science, Engineering, and Public Policy recommends that developing policies, standards, and infrastructure needed to ensure the integrity, accessibility, and stewardship of research data is a critically important task.<sup>5</sup> Grechkin et al. explained that open data is a vital pillar of open science and a key enabler for reproducibility, data reuse, and novel discoveries.<sup>6</sup>

## *The State of the Scholarly Record*

Scholarly communication is growing to incorporate more types of research and its outputs. Today, a wide range of research outputs, produced during initial collection as well as after formal publication, is being stewarded as part of the permanent documentation of scholarship, including research data, pre-prints, computer code, and more.<sup>7</sup> The management of a variety of research outputs and data becomes even more complex when specific approaches to their curation, management, metadata descriptions, and preservation are needed.<sup>8</sup> One would think that institutions would be acting to implement RDM services based on this growing problem, but a 2013 survey found that 82 percent of the respondent's home institutions had not implemented any institutional policy or services to address institutional RDM needs.<sup>9</sup>

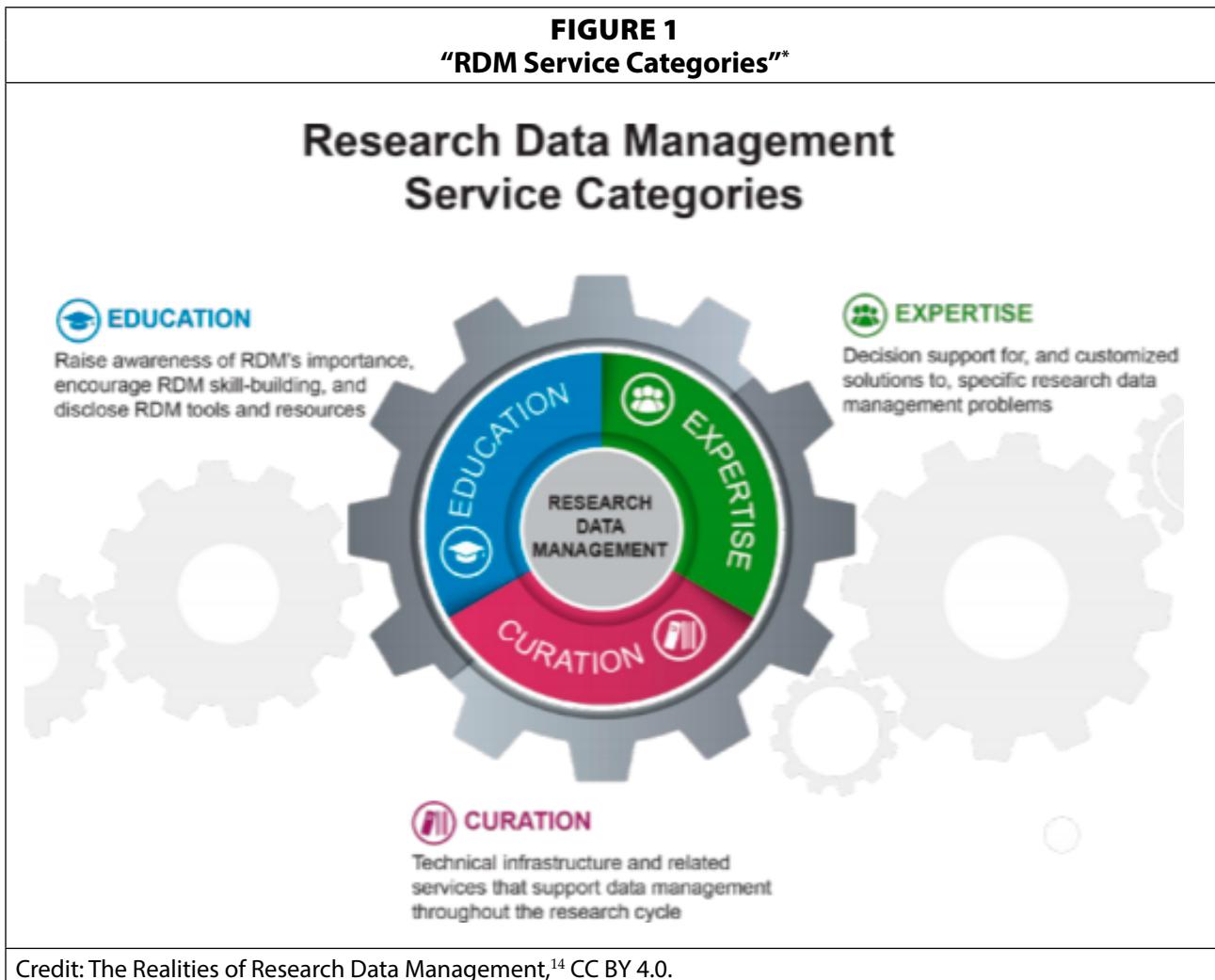
This disconnect between institutional services and meeting the RDM needs of today becomes even more apparent as journals and funding sources increasingly require data sharing. Projects are being undertaken to identify research data associated with publications that should be openly available. For example, the Wide-Open project is a text mining system for detecting datasets that were referenced in published papers but are kept private. After parsing over 1.5 million open access publications, Wide-Open has identified hundreds of datasets overdue for publication; 400 of them were then released within one week.<sup>10</sup> With efforts like the Wide-Open project and increased use of digital materials, sharing must become a practice of academia and the institutional services supporting that practice.

Given the value proposition of open data, the argument for data sharing is even stronger when we consider that by increasing access to research data, the amount of scholarly communication and scientific growth increases.<sup>11</sup> There have been significant shifts by many stakeholders like journals and funders, but studies show that most researchers have not received any training in RDM such as data management planning, metadata, or file naming. However, most researchers would welcome formal training in different aspects of RDM.<sup>12</sup>

## *Research Data Management Services Today*

RDM models have become common in many academic and research institutions but are highly diverse in scope and range.<sup>13</sup> The OCLC systematically analyzed and categorized the

primary methods of service delivery, detailing three general categories of service: education, expertise, and curation (see Figure 1).



These three different methods for delivery of service do not account for the actual content or specific support service that is provided but do categorize the models analyzed by the OCLC.<sup>15</sup> Although this visual above simplifies the RDM space, RDM crosscuts many departments, functions, and sectors of academia, government, and industry,<sup>16</sup> and can look significantly different between disciplines.<sup>17</sup>

### **Data Lifecycle Model as Conceptual Model for RDM Services**

Although RDM services have common models for delivery, the types of services differ. One conceptual model for framing RDM services is the data life cycle. According to Charalabadis et al., there are several data life cycle models being used globally, but the most comprehensive model is the Data Curation Centre (DCC) Data Curation Lifecycle Model,<sup>18</sup> since it includes administrative and managerial processes. DCC describes its Curation Lifecycle Model as a tool to help you “define research data management (RDM) workflows and associated roles and responsibilities within your organization,” providing a “holistic approach to RDM infrastructure development and optimization [that] can be used to help organizations map research data

management activities and support across functional and operational units.”<sup>19</sup> This generic but comprehensive design makes it ideal for developing RDM services at an institution that might not know its initial institutional needs. Molloy & Snow support this, noting that the majority of core RDM skills were generic across disciplines at the postgraduate level.<sup>20</sup>

This study adopts the DCC Data Curation Lifecycle Model.<sup>21</sup> as the basis for its survey of RDM services and the production of open and shareable research data. In summary, this choice was motivated by the fact that the model is

- applicable to a breadth of disciplines and domains of scholarly communication,
- holistic in considering both administrative and management design, and
- easily mappable to researcher tasks.

So how do RDM services based on the stages of the data curation lifecycle affect researchers’ ability and their sense of importance for producing shareable and open primary research data?

## Approach

To explore how RDM services affect researcher affordances for producing open data, a study of institutional services and researcher production of research was needed. Therefore, the current study targeted researchers who have used or have knowledge of their institution’s RDM services and the RDM specialists providing support. The sample would need to be distributed among as many institutions as possible to get a sample size that represents as many different RDM service models as possible.

There have been many large-scale research studies conducted on data sharing and preservation in higher education. These studies have looked at the delivery methods for RDM, journal requirements and their instructions on data sharing, and other studies measuring the awareness and capability of researchers. This approach complements the current research and looks more specifically at a gap in RDM service designs as it relates to supporting open data and the production of shareable research outputs.

## *Situating This Study in the Current Research*

When looking across the current research, there are many studies and articles highlighting different stakeholder needs and perspectives inside and outside of the US. Tenopir et al. provide insights into the institutional culture surrounding the research, process being the biggest barrier to sharing and preserving data.<sup>22</sup> Vasilevsky et al. found that 65.7 percent of the journals that they analyzed required reproducible data sharing but did not provide guidance on how to make research and data available and reusable.<sup>23</sup> Within this space of journals requiring data sharing, the Wide-Open project has pushed journals to honor their data sharing requirements, and of 473 datasets identified by Wide-Open by February 2017, 455 have been released.<sup>24</sup> Additionally, the Ünal et al. study demonstrated a clear gap in awareness and understanding of managing and sharing research data.<sup>25</sup> Together, these studies begin to tell a story with a missing stakeholder, the RDM services at institutions.

When looking at the research and literature into RDM service development in the United States, librarians have developed curriculums<sup>26</sup> and thoroughly identified the challenges, training, and research data management roles they now fulfil.<sup>27</sup> However, librarians as RDM service providers are only one model of delivery defined by the OCLC’s “The Realities of Research Data Management: A Tour of the Research Data Management (RDM) Service Space.”<sup>28</sup>

The OCLC thoroughly describes three types:

- Education—educating researchers and other stakeholders on the importance, and in some cases the necessity, of responsibly managing their data and making arrangements for its long-term curation
- Expertise—providing decision support and customized solutions for researchers working through specific RDM problems
- Curation—supplying technical infrastructure and related services that support data management throughout the research cycle

These three types of RDM service models are comprehensive but lack specific service types, i.e., data preservation or data analysis.<sup>29</sup> RDM services cover a lot of territory, and it is difficult to draw firm boundaries around this service space. Bryant et al. explain that the specific services offered within categories varied from institution to institution.<sup>30</sup> Although this is an excellent analysis of service models and how the service is delivered, it does not consider what stage in the data life cycle the service supports.

### ***Problem Statement***

Having evaluated the current literature and identified a study methodology that could provide an exploratory view into this gap in the research, this study aimed to answer the following problem statement: Do institutional RDM services framed in the stages of the data curation lifecycle affect the researcher's ability and sense of importance for producing open and shareable research data?

### ***Research Questions***

The following research questions will be tested to develop a better understanding of the variables that might be related to the problem statement above.

1. Do institutional aspects like location of RDM services, availability of RDM services, and institutional roles affect researcher's ability and sense of importance to produce shareable and open primary research data?
2. Do institutional services framed in the stages of the Data Life Cycle affect researcher's ability and sense of importance to produce shareable and open primary research data?

### **Methods**

To address the research questions, a survey method was used. Fourteen survey items were crafted to reflect the stages of the DCC Data Curation Lifecycle Model<sup>31</sup> stages, and the respondent was asked to consider services and resources at each stage. Additionally, the survey collected background information and measures of confidence and beliefs in relationship to open data and sharing research. These items and scales were then analyzed using the chi-square test of association. The results of those statistical tests were then combined to provide a more holistic view of each research question.

### ***Survey Sampling***

This study utilized non-probabilistic, purposive sampling for two primary reasons. First, the study and survey were intended for a target population within higher education that has experience with RDM and/or academic publishing. This population can be difficult to reach geographically and in a timely fashion. The second reason for the purposive sampling was to

collect responses from as many different institutions as possible, which required individual solicitation of survey participation.

The survey was distributed electronically using Qualtrics, an electronic survey tool, to a series of relevant research-minded library and information science email listservs with a strong US representation. These included the American Library Association's Scholarly Communication community, Research Data Access and Preservation, the California Association for Institutional Research, the Research Assessment and Metrics Interest Group from ACRL, the Open Data Research Interest Group of ALA, the OCLC Research Support community, and the Colorado Academic Library Association.

### ***Survey Items***

The survey included fourteen items or questions that gathered specific measures in relationship to the research questions. The items are nominal or categorical variables, or they are ordinal variables i.e., Likert scales capturing belief or traits. The survey items are listed below and include their short name in parenthesis, which is used throughout the remainder of the study. This survey used the following nominal measures:

- What is your experience with academic research at your institution? (Role)
- Please provide the name of your institution. (Institution)
- Where are research data management services located on your campus? Select all that apply. (Location)
- Do you have access to research data services like training, consultations, or tools that support the planning of research data collection, preservation, and analysis? (Planning)
- Do you have access to research data services like training, consultations, or tools that support the collection of research data? (Collection)
- Do you have access to research data services like training, consultations, or tools that support the description of data, like documentation that describes the data, using metadata standards? (Describe)
- Do you have access to research data services like training, consultations, or tools that support data analysis efforts like NVivo, Stata, SPSS, etc.? (Analysis)
- Do you have access to research data services that support the organization, cleaning, and management of research data? (Management)
- Do you have access to research data services, training, or tools that support the development of data management plans? (DMP)
- Are there training, courses, or certifications available at your institution that support research data management practices? (Education)

The following ordinal scale items were used to measure traits and beliefs:

- Do the research data management services and tools available to you support the creation and maintenance of data that would be shareable and openly publishable? (Support)
- How important is sharing research data? (Important)
- Can you produce/support research data that is shareable or could be made publicly available? (Ability)
- Is the success of scientific or academic publications dependent upon the availability of research data management services and tools? (Success)

## Data Analysis

The study utilized nominal and ordinal variables that limited the selection of statistical analysis to the chi-square test for association. The chi-square test for association measures the relationship between nominal variables and ordinal variables; specifically, do the values of one variable depend on the other nominal or ordinal variable? This type of significance either supported or rejected the null research questions and gave some degree of insight into the research questions. The research questions are presented in the findings section and are written in the form of the null research question or research question that was supported by the chi square test.

## Findings

The study's findings address the research questions and the relevant measures of association between survey items. Chi-square tests for association were used to accept or reject each null research question. The data met all assumptions of the chi-square test for association. Additionally, some descriptive statistics about the sample are presented. The survey items are referenced by their shorthand title, which is listed in the survey item section above.

## Sample Description

The study sample consisted of  $N=46$ . The survey completion rate was  $46/108 = 42$  percent. The overall response rate is not known as the total eligible population reached via email listserv is uncertain. The final sample had representation from private, public, community college, four-year, and graduate American higher education institutions and represents a diverse geographic sample (see figure 2).

The survey sample had almost equal responses of researchers and RDM support personnel (see figure 3). The survey provided the option to select both role types, but no respondents identified as both.

**FIGURE 2**  
**Geographic Location of Participant Institutions**



### Research Question 1

Research question 1 explored institutional aspects like location of RDM services, availability of RDM services, and institutional roles that affect researcher's ability and sense of importance to produce shareable and open primary research data.

**There was an association between location and importance.**

A chi-square test of association was performed to examine the relationship between location of RDM and a researcher's belief in the importance of open data and sharing research. The relationship between these variables was significant,  $X^2 (4, N = 44) = 11.973, p = .018$ . When services are located at the library, they are associated with more importance.

**There was an association between location and ability.**

A chi-square test of association was performed to examine the relationship between location of RDM and a researcher's ability to produce open data and share research. The relationship between these variables was significant,  $X^2 (3, N = 44) = 9.469, p = .024$ . The association of services at the library had a relationship with their ability.

**There was no association between role and ability.**

A chi-square test of association was performed to examine the relationship between a researcher's role and a researcher's ability to produce open data and share research. The relationship between these variables was not significant,  $X^2 (6, N = 44) = 6.387, p = .381$ .

**There was no association between role and importance.**

A chi-square test of association was performed to examine the relationship between a researcher's role and a researcher's belief in the importance of open data and sharing research. The relationship between these variables was not significant,  $X^2 (4, N = 44) = 5.351, p = .361$ .

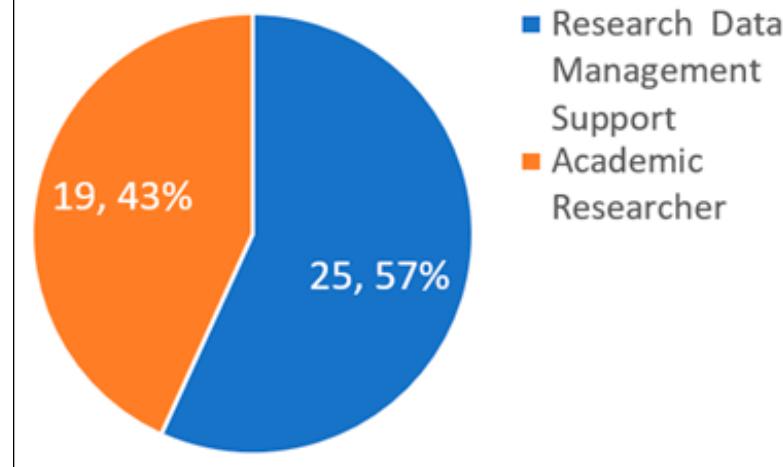
**There was an association between availability and importance.**

A chi-square test of association was performed to examine the relationship between location of RDM and a researcher's belief in the importance of open data and sharing research. The relationship between these variables was significant,  $X^2 (4, N = 44) = 11.973, p = .018$ . When services are made available, there is an association with importance.

**There was an association between education and importance.**

A chi-square test of association was performed to examine the relationship between the availability of RDM education and a belief in the importance of open data and sharing research.

**FIGURE 3**  
**Survey Participant Roles Count**



The relationship between these variables was significant,  $X^2 (2, N = 44) = 6.515, p = .038$ . The presence of educational services had an association with a researcher's ability.

### ***Research Question 2***

Research question 2 explored institutional services framed in the stages of the Data Life Cycle, and if they affect researcher's ability and sense of importance to produce shareable and open primary research data.

**There was no association between services across the data curation life cycle and ability.**

A series of chi-square tests for association were performed to examine the relationship between RDM services across the data curation life cycle and a researcher's ability to produce open data and shareable research. The relationship between these variables was not significant at any intercept.

**There was an association between support and services across the life cycle.**

There was a relationship between access to services at each stage and those services supporting the production of open and publishable primary research data. The relationship between these variables was significant, with a minimal significance of  $X^2 (2, N = 44) = 6.093, p = .048$  found at the data collection stage.

**There was an association between data management plans and support of open data and shareable research.**

A chi-square test of association was performed to examine the relationship between data management plans and a researcher's ability to produce open data and shareable research. The relationship between these variables was significant,  $X^2 (1, N = 44) = 7.801, p = .005$ .

## **Discussion**

The survey data provided insight into the impact on the production of open and shareable research data from two contexts: the availability and home of RDM services in an institution, and the framing of services through the Curation Data Lifecycle Model. It also provided direction for future areas of study.

### ***The Availability of RDM Services as an Aspect of Awareness***

The study showed a significant association between the availability of RDM services and the importance of open data and shared research. It also showed a significant association between the availability of RDM services and researcher ability to produce open data and shareable research. These associations mean that when an institution has invested in and created RDM services, faculty have more confidence and belief of the importance for sharing data and research.

The significance of this finding is that RDM services not only help support good data practices at an institution, but their very availability serves an advocacy role, raising awareness of open data and research-sharing policies and their benefits. For information professionals planning RDM services, it is worth considering that they respond to existing institutional needs for open and shareable data.

### ***Current RDM Services and Open, Shareable Research***

When it came to finding significant associations between RDM services modeled after the Data Curation Lifecycle and open data or shareable research production, the survey produced mixed results. The survey did not yield significant associations between a researcher's ability to produce open research and the stages of the data curation life cycle. This needs to be analyzed further as there are likely further factors motivating a researcher's ability to produce open data and shareable research beyond the availability of services at each stage. The possible variables could be incentives, researcher motivation, technology need, etc.

There were significant associations between services provided at the library at each stage of the data curation lifecycle and support that leads to open and shareable research data. When RDM services are located at the library, they have a stronger association with producing open data and shareable research. It's not apparent why this is so, though it may be a factor associated with the academic library's traditional role as a service provider between units, which positions them well for advocacy or, at a minimum, awareness of their services. As Heidorn argues, RDM activities align well with the infrastructure and traditional skills of libraries.<sup>32</sup>

Indeed, the survey found that a majority of the RDM services at institutions represented in the sample were found or provided through the library in the US. One of the most significant trends is for libraries to work in conjunction with other units in their institutions, for example information technology units and research offices, to support RDM.<sup>33</sup> Since 80 percent of respondents identified RDM services at the library, the libraries should be the primary location for these types of services.

In practice, centralizing RDM services at libraries, even when offering those services through partnerships between units, helps promote open and shareable research at the institution.

### ***Data Management Plans as a Promising Practice***

RDM services supporting the development of data management plans had a strong association with a researcher's ability to produce open data and shareable research. In addition, data management plans might bring insights into the needs of researchers and institutional service design.<sup>34</sup> Williams et al.'s research into data management plans did find increased data sharing, but not necessarily research that was reproducible.<sup>35</sup> Further research into what could be considered a comprehensive data management plan should be undertaken as federal mandates and many grant funding opportunities begin to require data management plans.<sup>36</sup>

### ***Limitations***

The first limitation of the study is the representativeness of the greater American higher education landscape. The survey could have collected more background information and been circulated to a more diverse population. For example, no two-year institutions were included in the sample. The non-probabilistic, purposive sampling method would need to be extended further and more participants would need to be identified and contacted to obtain a more diverse sample.

A second limitation is a potential for confirmation bias in some of the survey items. Certain nominal survey items did not include an "unsure" option when describing available RDM services at their respective institutions. While the survey was distributed to a very specific population with knowledge of RDM services, this presumed a level of familiarity with the full

institution's services that may not be entirely representative of the roles. Further, researchers with multiple RDM roles were either not represented or did not identify as such in the sample.

Another limitation of the study was that it did not look at motivational aspects for sharing research and producing open data. Motivation—whether it be promotion, incentives, or grant requirements—could provide additional clarity on researcher's belief of importance in sharing research and producing open data.

### ***Future Directions***

The first recommendation for continued research would be to combine this data curation lifecycle-framed model of RDM services with a needs analysis. Assessment data and data management plans should significantly influence the selection or addition of RDM services and policies that guide their implementation.<sup>37</sup> Starting with a holistic data curation lifecycle-framed approach to RDM services and then iterating and refining to meet an institution's need through tracking of service use could lead to an effective RDM service model.

The second recommendation for continued research would be to modify this survey for a specific academic discipline. The data could be used to identify missing or wasted RDM services. There is some research in certain disciplines like the social sciences in the United Kingdom<sup>38</sup> or social and economic sciences in Germany<sup>39</sup> where growing awareness of data sharing and publishing of reproducible research is occurring. However, further research into available RDM services and their ability to support discipline-specific researchers in production of open data and shareable research is still needed.

The third recommendation for continued research is the effects of funding requirements or incentives on a researcher's belief in the importance and ability to produce open data and shareable research. Questions of researcher motivation are not addressed in this study but could affect the perceived importance of open data and sharing research.

The final recommendation for further research is the implications of the 2020 COVID-19 pandemic and institutional shifts to digital academic resources. This survey was administered during the pandemic, which may skew its data, but the potential impact is currently unknown. With an increase of digital content use, it remains to be seen if researchers are becoming more familiar with open content.<sup>40</sup> This new digital demand might have even changed budgetary concerns<sup>41</sup> and brought a renewed vigor for open data and shareable research. The impacts of this digital shift on the needs of RDM services should be researched further.

### ***Conclusion***

This study into research data management (RDM) services and the production of open data and shareable research was intended to fill a gap in the current RDM literature by addressing the problem statement: How do institutional RDM services framed in the stages of the data curation lifecycle affect researcher's ability and sense of importance for producing shareable research and open data? To address this problem, a set of research questions were tested using a survey methodology and statistical analysis.

The research question that addressed the data life cycle and how it might affect researcher's ability and sense of importance to produce shareable and open primary research data was partially rejected when there was no significant relationship between researcher's ability and access to data curation lifecycle services. However, there was a relationship between access to services at each stage of the life cycle and the belief that those services would support the

production of open and publishable primary research data. The rejection of one research question and the acceptance of another was an indicator that more work needs to be done on applying the data curation life cycle.

The research question that addressed institutional aspects like location and availability of RDM services and institutional roles and how much they affect researcher's ability and sense of importance was partially supported. The association that was significant was the location of services that did have significant relationship with ability and importance. The second association between availability of services and researcher's ability was found to have significant associations. The third association between availability of services and researcher's sense of importance for open data and shareable research was found to have significant associations. However, role association with ability or importance had no significant associations. While not all associations were accepted, the first three were found to be significant and will need additional research.

When we return to the problem statement, there is no clear answer to the use of the data curation lifecycle as a frame for RDM service models in the US. However, there were several interesting findings, such as the promising potential for data management plans and libraries as key locations for housing these RDM services. These findings have only led to more questions to explore at the intersection of open data and RDM service design.

## Appendix A. Survey Questionnaire

### Open Primary Research Data Survey

This survey references research data management, which is the care and maintenance of data during a research cycle. Funding agencies are increasingly requiring data management plans and research data management practices that would support dissemination of research to collaborators, evaluators, or other parties.

For this survey you will be asked to consider your institution's, college's, or university's research data management services. These services can often be provided through the library, institutional research, or an office of data analytics. These services might also be hosted by individual departments. When answering these questions, use that information to complete the following questions.

What is your experience with academic research at your institution?

- I support or provide research data management services.
- I produce academic research.
- I have experience using research data management services and tools but am not published.

Please provide the name of your institution.

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Where are research data management services located at your institution?

- The library
- A data services office
- other

The following questions will ask about available research data services like consultations, training, or tools that train and support researchers to generate primary research data. For additional information please visit Data Curation Life Cycle description and consider all research supports at your institution when answering.

Do you have access to research data services like training, consultations, or tools that support the planning of research data collection, preservation, and analysis?

- Yes
- Yes, but quantitative and statistical data only
- Yes, but for qualitative data only
- No

Do you have access to research data services like training, consultations, or tools that support the collection of research data (i.e., survey tools, recording software, or tools where observations are made either by hand or with sensors or other instruments and the data are placed into digital form)

- Yes
- Yes, but quantitative and statistical data only

- Yes, but for qualitative data only
- No

Do you have access to research data services like training, consultations, or tools that support the description of data, like documentation that describes the data, using metadata standards?

- Yes
- Yes, but quantitative and statistical data only
- Yes, but for qualitative data only
- No

Do you have access to research data services like training, consultations, or tools that support data analysis efforts like NVivo, Stata, SPSS, etc.?

- Yes
- Yes, but quantitative and statistical data only
- Yes, but for qualitative data only
- No

Do you have access to research data services that support the organization, cleaning, and management of research data?

- Yes
- Yes, but quantitative and statistical data only
- Yes, but for qualitative data only
- No

Do you have access to research data services, training, or tools that support the development of data management plans?

- Yes
- Yes, but quantitative and statistical data only
- Yes, but for qualitative data only
- No

Are there training, courses, or certifications available at your institution that support research data management practices?

- Yes
- No

Does the research data management services and tools available to you support the creation and maintenance of data that would be shareable and openly publishable?

- Yes
- No

You are almost done! This final set of questions will ask you about your confidence in, the importance of, and ability to create or use shareable/open primary research data.

How important is sharing research data?

- Extremely important
- Very important
- Moderately important

- Slightly important
- Not at all important

Can you produce/support research data that is shareable or could be made publicly available?

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

Is the success of scientific or academic publications dependent upon the availability of research data management services and tools?

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

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# A Model to Determine Optimal Numbers of Monograph Copies for Preservation in Shared Print Collections

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In this study we developed a model and a spreadsheet tool for calculating, based on user input informed by available data, the probability of at least one usable copy of a monograph title surviving at various time horizons in shared print collections. The calculation incorporates four risk factors, which were assigned values based on research in the literature and our own studies. We applied the model to sample selected time horizons and risk tolerances, which suggests a minimum number of copies of a title needed for retention.

## Introduction

Shared print library agreements offer a natural extension to research libraries' missions: they provide an extended pool of print resources to their user communities while attempting to secure the accessibility of each title well into the future. Many libraries are using networked retention commitments as part of their criteria when making collection management decisions. An evidence-based approach to determining retention targets—how many copies to keep, with the intent of limiting the probability of loss or irreparable damage to all copies of a title—has so far been lacking.

Retention commitments may serve a variety of goals. Fundamentally, they are intended to ensure access to a title through the term of the agreement. The duration of retention agreements differs between programs and ranges from as little as ten years to essentially unrestricted or permanent retention. In reality, it is not possible to guarantee that every title will survive in its

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physical form. Humanity has lost texts throughout history, and it will continue to do so. In fact, it is likely that there are titles for which all copies now listed in WorldCat are unusable. While it should be rare, total loss will occur, and may occur in large enough numbers to cause discomfort. Shared print efforts cannot counteract every risk, but they provide a means to mitigate loss by providing better controls, distributing responsibilities and risks, and establishing intentional, multiparty oversight of collections management.

We look at large-scale issues as they affect consortia, geographic regions, and the implicit “collective collection” that libraries participate in through interlibrary loan (ILL) and similar consortial interlending systems. We focus on “average” books, for which the key retention decisions are how many and in which commonly available storage conditions to hold them.\* This study is an investigation of retention decisions that we expect to be broadly applicable and that will ensure a high probability of survival of titles. The calculations are based on factors affecting every library and library collection, such as types of storage facility, prevailing or estimated risk of loss, or age and condition of subsets of collection material. One by-product of our study is to identify minimum viable levels of extant copies at which libraries have few or no options beyond retention of all copies and, implicitly, taking additional conservation and preservation actions to maintain those copies.

This is not a study of traditional preservation strategies, such as conservation treatment methods, protective enclosure designs, standards for preservation materials, or environmental controls. These preservation strategies will affect longevity and usability of specific groups of materials within the collection, and, therefore, the network-level retention targets of shared print networks. Although not the primary goal of this paper, the methodology that we present allows decision-makers to understand and quantify the impact of improved preservation strategies, at least in an approximate way, on enhancing the overall prospects of a print archive. As such, our methodology can aid in measuring the impact of preservation efforts, as well as determining appropriate resource investments and justifying them. We are suggesting a “Lots of Copies Keep Stuff Safe” strategy based on quantifiable metrics as part of an overall preservation strategy that is reliant on, and could affect the selection of, appropriate, traditional preservation strategies.

In this paper, we develop a quantitative model that enables us to identify tangible retention targets based on what is known about the key reasons that copies of book titles become lost, unusable, or otherwise unavailable over time.<sup>†</sup> We specifically include the following factors in the model: (1) on-shelf probability—the probability that an accurately-cataloged book is on the shelf or in a known location; (2) bibliographic record inaccuracy—the bibliographic record differs from the item known to be on the shelf; (3) annual loss rate—the annual rate at which copies are physically lost from the collection; (4) physical deterioration over time—the

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\* For our purposes, an “average book” is one that represents traits most commonly held in libraries. While in North America the average book may be in English and about 45 years old, one can define average books that exhibit specific traits, such as in Spanish, 100 years old, or having a specific construction. In our study we use a few different average books, mostly based on age.

<sup>†</sup> Throughout this study reference is made to titles and copies. In this context, a title is equivalent to the IFLA Functional Requirements for Bibliographic Records definition of a “manifestation,” while a copy is the equivalent to the FRBR definition of an “item” (IFLA Study Group on the Functional Requirements for Bibliographic Records and International Federation of Library Associations and Institutions, eds., *Functional Requirements for Bibliographic Records: Final Report*, UBCIM Publications, new ser., v. 19 (München: K.G. Saur, 1998): 17–24). The loss of a copy means there are fewer copies of a given title available; the loss of a title means that no usable copies of that text have survived.

book is still available but degrades in usability over time, as a function of initial condition, use, storage conditions, and inherent vice. There are, of course, other reasons why copies of books are lost or irreparably damaged, but which we chose not to include in the model as discussed later in this paper.

The model and recommendations in this paper are intended to provide guidance as libraries and consortia are determining the number of copies of a title to retain to ensure with a high probability that at least one usable copy remains at the end of a specified time horizon; we refer to this probability as  $P_1$  for short. Although the model is designed to be general and flexible, and therefore can be utilized for other formats facing similar types of risk and physical degradation, the parameters chosen for our calculations are specific to print monographs.

When calculating the number of copies, it is assumed that said copies will have retention commitments. Commitments are necessary as, without them, copies may be withdrawn at any time, and they could not be relied upon to contribute to achieving the desired probability of at least one usable copy remaining.

## Foundations for this Study

Our present work is founded on two articles. The first is “Optimising the Number of Copies and Storage Protocols for Print Preservation of Research Journal.”<sup>1</sup> This paper by Yano et al. describes the first attempt at developing a model to aid in recommending retention of a given number of serial copies to ensure adequate preservation. The model incorporates some of the same factors that we consider in our study, but was designed for serials in particular, and for settings in which a few copies could be page-verified and placed in secure storage (e.g., off-site versus open library stacks), and backup copies could be committed and subsequently page-verified and moved to secure storage in the unlikely event that a copy in secure storage were lost or irreparably damaged. The need for page verification was motivated by JSTOR’s need for clean (page-verified) copies to be scanned for inclusion in an electronic archive. In the setting we envision for this study, however, page verification for the monographs is not required. Similarly, for commonly occurring retention arrangements, a consortium would likely find it difficult to keep careful track of the number of monograph copies in secure, off-site storage and to coordinate replacement of a lost or irreparably damaged securely stored copy with one of the committed copies from elsewhere. Instead, for monographs, we envision that consortia would make decisions at a given time point regarding how many copies to keep in off-site storage and in stacks. Moving these copies at later dates could change the likelihood that one remains viable at the given horizon.

Furthermore, serials are structurally quite different from monographs and have historically been used differently. The authors of the Yano et al. study used a conservatively high annual loss rate of 0.5%, which means that, on the average, nearly 40% of a collection would be lost after a hundred years. This loss rate may be reasonably accurate for serials, where many works, in the form of articles, are bound together and shelved in open stacks. Serial volumes often show signs of excessive wear due to high use. Monographs do not appear to be used in the same way. Most monographs are used lightly if at all.<sup>2</sup> The ways that articles in a journal are used, defaced, and damaged differs from chapters in books. Because of the explicit consideration of page-verified copies in secure storage (with excellent environmental conditions), the Yano et al. study focused on the impact of loss of bound volumes and did not account for physical deterioration. Our context differs because the smaller usage rate of monographs means that

physical loss rates will be much lower. At the same time, the lack of both page verification and commitments to maintaining a minimum number of copies in secure storage, which typically also offers much better environmental conditions, means that physical degradation plays a larger role in the context of monographs. The model that we develop in this paper aims to account for these differences and other practical realities that apply to monographs.

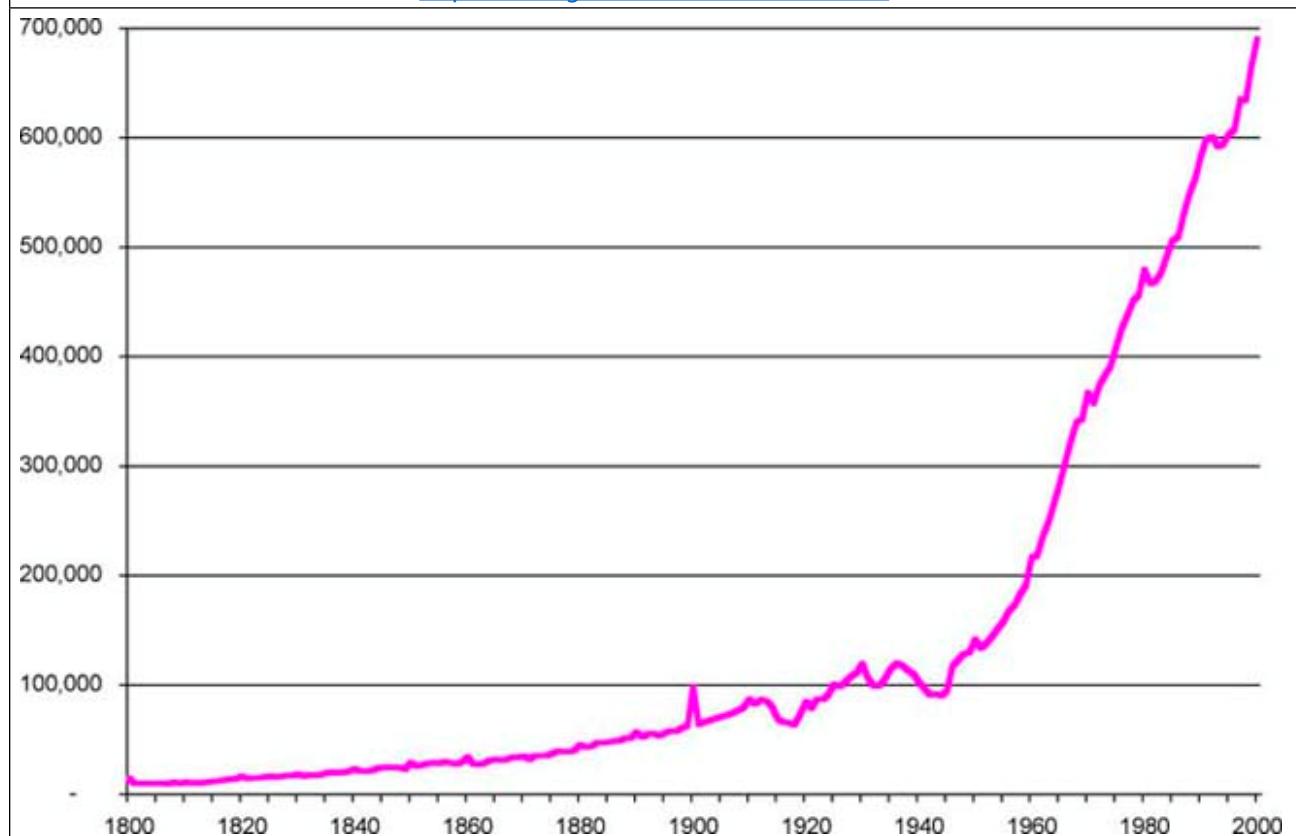
This brings us to the second foundation article for this study: "Everything Not Saved Will be Lost," in which the authors attempt to identify the factors that will affect long-term retention in the context of shared print initiatives.<sup>3</sup> The holy grail is a well-reasoned recommendation on the number of retention commitments that each title needs. "The problem is that generating a recommended number is difficult, because to do so responsibly requires balancing several factors such as level of validation, condition, risk of loss, and long-term environmental storage, few of which have available data."<sup>4</sup> Solving this problem is possible by attempting to use rationally curated values and applying a mathematical approach.

### *Profile of Scholarly Print*

For some, picturing a representative example of a book in a research library may conjure an image of an older, brittle item. The truth of the matter is that collections are, as a whole, much younger. There was a gradual increase in the number of titles published throughout the nineteenth century and a sharp increase after World War II. Schonfeld and Lavoie used

**FIGURE 1**  
**Print Manifestations by Year of Publication, 1800–2000**

Reproduced by permission from Roger C. Schonfeld and Brian F. Lavoie, "Books without Boundaries: A Brief Tour of the System-Wide Print Book Collection," *The Journal of Electronic Publishing* 9, no. 2 (2006), <https://doi.org/10.3998/3336451.0009.208>.



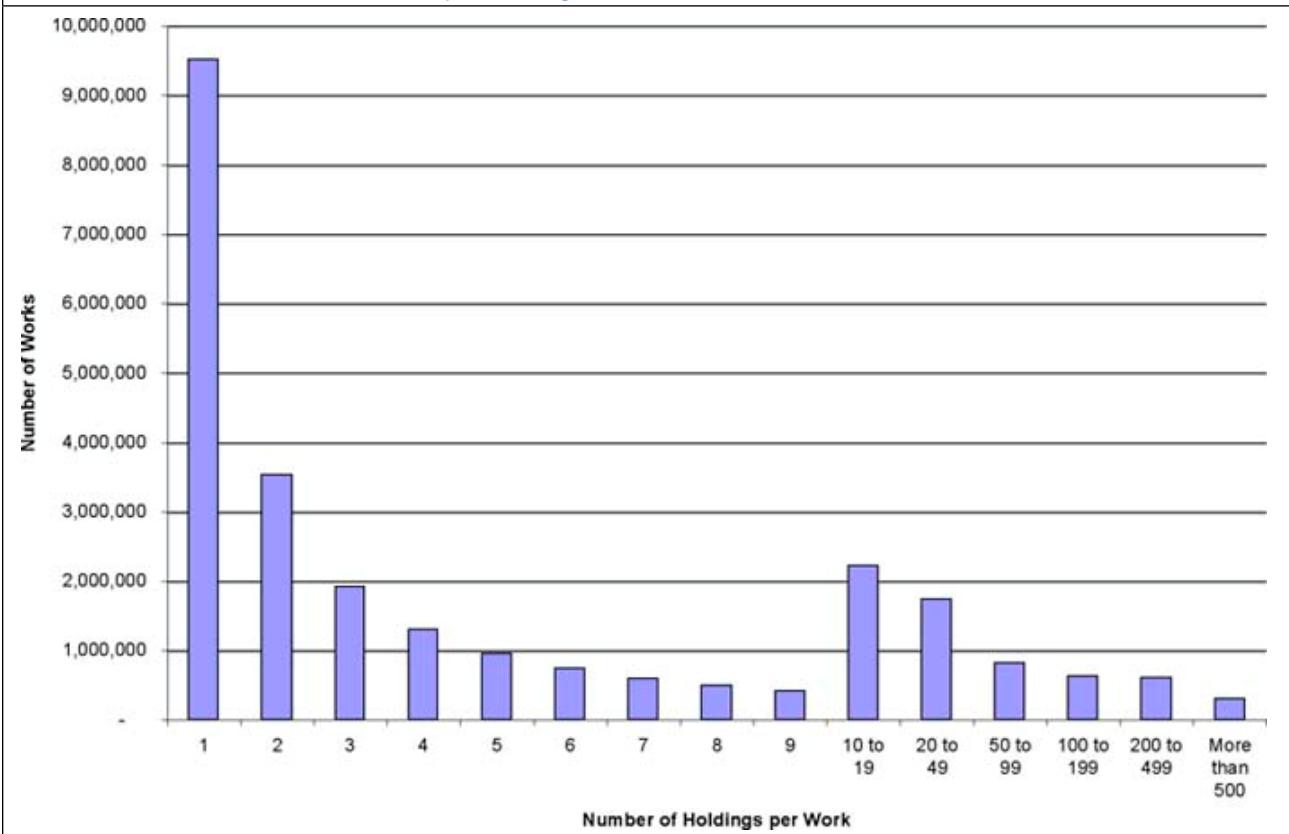
a dataset that ended in January 2005 to show that about half of all library collections were published after 1977, essentially the most recent thirty years at the time of publication, as illustrated in figure 1.<sup>5</sup> A simple analysis of ReCAP's (Research Collection and Preservation Consortium, offsite storage for Columbia, Harvard, and Princeton universities and for the New York Public Library) collection of nearly seventeen million volumes shows similar results.<sup>6</sup> The median publication year of ReCAP's collection among titles published between 1800 and 2004 is 1975. Granted, materials in the ReCAP collection are expected to have lower circulation and may skew older than those materials the libraries retain on-site, possibly explaining the small difference in median age. Holdings from the fifteen years following 2006 make up almost 18% of all of the holdings, moving the median publication date at ReCAP's facility to around 1985.

Research by OCLC has shown that scarcity is common. The collective collections attempt to promise greater depth and continued access to a long tail of low use works that may otherwise be inaccessible. Approximately three quarters of the print book collections held by the Big Ten Academic Alliance (BTAA) members are held by three or fewer BTAA libraries.<sup>7</sup>

Lavoie and Schonfeld also found that there was a significant percentage of unique and scarcely held materials recorded in WorldCat. Many of these materials are locally produced ephemera. About 36% of all titles are uniquely held. The published graph (see figure 2) appears to show that 25% had ten or more copies, including 1.2% that had more than 500 copies.<sup>8</sup>

**FIGURE 2**  
**WorldCat Data Showing Number of Holdings per Work**

Reproduced with permission from Roger C. Schonfeld and Brian F. Lavoie, "Books without Boundaries: A Brief Tour of the System-Wide Print Book Collection," *The Journal of Electronic Publishing* 9, no. 2 (2006), <https://doi.org/10.3998/3336451.0009.208>.



There are indeed very widely held materials, but they are a small subset of the corpus held in libraries nationally.

Connaway et al. suggest that the profile of uniquely held materials skews older than overall library collections.<sup>9</sup> They found that the median age book in Vanderbilt University Libraries' collection was published in 1970, while the median publication date of the uniquely held materials was 1928. If this holds true nationally, or at least in academic libraries, it suggests that scarcely held materials have a greater chance of being older and at higher risk than more commonly held materials. It should also be noted Connaway et al. found a disproportionate number of pamphlets among the unique copies. A full 30% of the unique copies were pamphlets, compared to 10% in the full collection. These findings are not dissimilar to those of Lavoie and Schonfeld, that a large percentage of uniquely held materials are local ephemera.

### *Shared Print and Deaccessioning*

Shared print is often seen as a way in which libraries can alleviate pressure on library physical spaces while preserving the scholarly record.<sup>10</sup> Libraries can deaccession local copies based on the presence of a committed copy held elsewhere, reducing costs without eliminating access. Horava describes a future in which libraries relieve themselves of reputations based on the size of their owned collection and focus on what is accessible to their users.<sup>11</sup> Libraries no longer would be gatekeepers to information as much as those who make sense of the ocean of resources. This vision gains the advantage of almost limitless resources at the expense of intangible, impermanent, and unpredictable resources.

The recent growth of shared print programs is extraordinary, with over forty million commitments made by February 2018, essentially five years into the first wave of shared print initiatives.<sup>12</sup> One could imagine—with the growth of shared print, the attraction of deaccessioning responsibly based on external retention commitment, and the commonality of scarcity—how easy it would be to inadvertently reduce the number of copies of a title below the threshold of tolerable risk. Without commonly agreed on retention numbers, it is likely that mistakes will be made, putting titles at a risk of total loss. This risk is especially problematic because of the difficulty in finding replacement copies several years after publication.<sup>13</sup> Agreements and a common idea of risk mitigation can help alleviate some of the uncertainty about loss, but it will require building trust and a broader view of a user base than just those who come through a library's door. "If fewer print materials are available in close proximity to users, it becomes important to ensure convenient discovery and delivery of those materials within new arrangements."<sup>14</sup>

Although it can still be difficult, the sharing of retrospective collections is making cooperative purchasing much more palatable.<sup>15</sup> There is hope that as libraries build trust with each other there will be more opportunities for developing collections collaboratively. Cooperative programs are indeed growing, with many noting cost savings as the primary driver. There is also an additional benefit of collectively extending the collection breadth and expanding what is available to users.<sup>16</sup> Cooperative collecting programs are still gaining steam, and as they do, it is imperative that they consider how many copies will be necessary.

### **The Monograph Risk Model**

The model developed for our study is a generalization of that in Yano et al.,<sup>17</sup> which accounts primarily for physical losses of materials over time, with loss rates being differentiated by

storage conditions. Having identified several other factors contributing to losses, as described below, we developed a mathematical representation of the probability that at least one usable copy remains for each year up to a specified time horizon in the future, given user-specified numbers of books in each user-defined initial condition and storage condition. Once a shared-print program decides on its acceptable probability of at least one usable copy surviving ( $P_1$ ) at a specified point in time in the future ( $T$ ), it can use the model to aid in searching for the numbers of copies in various initial conditions and various storage conditions on which retention commitments would be needed to achieve  $P_1$ .

The spreadsheet implementation of this model is flexible and can accommodate a variety of numerical inputs, not the least of which is a usability trajectory that reflects the impact of degradation over time. When this model was first developed, we had not settled on a particular usability curve, so we considered it important to allow the user to input usability estimates that may differ based on the initial condition of the books and on storage conditions.

We assume the value of  $P_1$  is selected based on a library's or group of libraries' risk tolerance for losing access to the material during an agreed-upon time horizon. The scale may consist of a handful of libraries or all research libraries in a geographic area or country. A larger group of libraries may naturally desire a higher value of  $P_1$  because of the larger aggregate value of availability of the material to the group (versus one library). Consortia may decide to set higher values of  $P_1$  for particularly valuable material and/or material that they hope to retain for much longer than the initial planning horizon. Regardless, it is imperative that libraries within a group agree on  $P_1$  values and planning horizons; otherwise libraries with lower risk tolerance could unknowingly miss their thresholds if libraries with higher tolerances withdraw books.

The focus of this model is titles, not books. Libraries often discuss preservation and loss in the context of individual items. For the purposes of this project, our team ignored the individual items and concentrated on the combined copies that comprise a title. The model and calculations are for groups of copies that should be considered duplicate intellectual units, which we refer to as a "title." When we talk about loss, we are referring to the total loss of all copies of said title among those held by a shared print consortium. Our work is concerned with minima for preservation; adequate coverage for access is out of this project's scope.

## **Identifying and Quantifying the Risk Factors**

Determining an adequate number of copies that should be retained depends upon a quantitative assessment of the risk factors that contribute to calculating  $P_1$  for a given set of retained copies. Then an acceptable risk tolerance must be decided for the target time horizon in view of the cost of retaining the associated number of copies, with the copies possibly held in different storage conditions.

Previous research has identified many factors that can influence risk to usability of books over time, both positively and negatively. The most accessible breakdown of risk factors for heritage collections appears on the Canadian Conservation Institute website, where ten agents of deterioration are listed: physical forces, fire, pests, light, incorrect relative humidity, thieves and vandals, water, pollutants, incorrect temperature, and dissociation.<sup>18</sup> Other guides to risk assessment are also available.<sup>19</sup> We identified four factors as critical for the long-term survivability of monographs: (1) on-shelf probability; (2) bibliographic inaccuracy; (3) accidental physical loss or irreparable damage; and (4) gradual physical deterioration, which depends

on the initial condition and future storage environment.\* A discussion of other factors that might impact title availability is provided later in this paper.

### ***Factor 1: On-Shelf Probability***

On-shelf probability is the chance that a given item's whereabouts is known. On-shelf probability is calculated only at the time of the initial analysis and provides a stand-in for actual validation at the shelf. We know that research collections have some books that are recorded in the catalog but cannot be located: they are not on the shelf, not checked out to a borrower, not in process, or not otherwise findable. In an ideal world a shared print commitment would begin with a validation check that each book committed to the program can in fact be located; in practice such validations are too labor-intensive to implement. The on-shelf probability factor measures the likelihood that a book selected from the catalog is not available to contribute to the survival of the title in the future.

Our generalized estimate of the probability that a book in the catalog cannot be found on the shelf derives from the EAST Validation Study.<sup>20</sup> The EAST study, which received data from over fifty libraries and assessed over 316,000 books, found that 97% of the items were on the shelf or could be accounted for (or, alternatively expressed, 3% of the items could not be located). Interestingly, the on-shelf rate stayed relatively consistent regardless of publication date across the range from 1850 through 2010, as shown in table 1. The average (and median) on-shelf percentage from 1821 through the end of the study was 97.4% (97.57%).

The fact that the on-shelf percentage remains relatively constant in the data reported in the EAST study lends weight to the theory that overall annual loss is insignificant. (See the discussion on Factor 3, Annual Loss Rate, below.) Known losses would not appear in the on-shelf percentage because those items would be removed from the catalog. The EAST data suggest that unknown disappearances of copies generally occur early in an object's lifecycle, when use is higher, followed by little additional loss of copies as the title ages.

A study at Indiana University found that 2% of materials in the open stacks were missing but went on to say that the material in storage has always been found when requested.<sup>21</sup> Indiana follows a common practice in high-density storage facilities: when items are first processed into storage, staff touch each item and confirm their records. For the libraries that follow these procedures, books are all but guaranteed to be on the shelf with a good quality record. Data from a large swath of research libraries indicates that an average of 1.5% of the total number of volumes circulate each year, and the rate for items in storage is even lower.<sup>†</sup> Furthermore, anecdotal evidence suggests that only a small fraction of the volumes that do circulate are not returned. If such an item is not returned, presumably the library is aware of it and may attempt to replace it. Even if the library fails to replace a known loss, the prob-

\* In our model, all of the physical risks presented in the Canadian Conservation Institute list are merged together as either (3) annual loss rate, which includes accidental physical loss or irreparable damage, or (4) physical deterioration over time. Our risk (2) bibliographic inaccuracy is a form of dissociation, and (1) on-shelf rate is affected by prior actions of thieves and vandals—although such loss could also be an unintended accident.

<sup>†</sup> The 2019/20 ARL statistics, excluding the public (Boston, New York Public Library) and government (Library of Congress, National Library of Agriculture, National Archive, National Library of Medicine, and Smithsonian) libraries and the Center for Research Libraries, reports that the number of circulations as a percentage of the collection is 1.5% on average. Minimum (Wayne State) = 0.2%, maximum (Brigham Young University) = 5.1%. ("ARL Statistics 2020," Washington DC: Association of Research Libraries, September 9, 2001, <https://www.arlstatistics.org/repository>.)

ability of loss for a volume held in storage is exceedingly small in the context of the collection as a whole.

To recap: while we recognize that the actual rates may vary widely for different libraries or different collections, we are confident that a rate of 97% on-shelf provides a reasonable estimate for describing broad, generic research library collections in situations where an on-shelf validation step has not been performed. If the copy is held in storage, we use an on-shelf probability rate of 100%. If a library is more or less confident that any given item is on the shelf for a specific collection, a different percentage can be entered into the spreadsheet tool.

In the model, the on-shelf probability rate applies only at the point of analysis, in order to estimate past unknown losses that reduce the number of copies of a title now available to contribute to its survival. Subsequent losses are calculated in (3) annual loss rate and (4) deterioration, as described below.

### **Factor 2: Bibliographic Inaccuracy**

Michaels and Neel note that while it is becoming common that libraries are making large-scale retention decisions based purely on metadata, there is concern about the quality of the metadata and the lack of common agreement on loss and risk.

There are many discussions in the shared print community of how many copies are enough to ensure that the scholarly record is both preserved and accessible. Ensuring that enough copies are retained is a matter of having confidence in the records, but also accepting that there will be a margin of error in the accuracy of holdings statements. If we know that, for example, in most libraries the margin of error is 10%, then we could factor that into how many copies we keep. The difficulty though is in knowing what that percentage of error is so that it can be accounted for across the collective collection. By guessing at a percentage, we risk saving too many or too few copies. There are a few studies that report on error rates that we can look to for guidance; however, more information is needed before broad generalizations can be made.<sup>22</sup>

**TABLE 1**  
**Data from the EAST Validation Study,**  
**Set Out to Show On-shelf Probability as a**  
**Factor of Date of Publication**  
 (Sara Amato and Susan Stearns, East Validation Data, 2018. Unpublished, provided by the authors.)

Pub. Date	Total Number of Books	Present	% Present
<1800	23	21	91.30%
1800–1810	57	54	94.74%
1811–1820	54	50	92.59%
1821–1830	107	105	98.13%
1831–1840	150	145	96.67%
1841–1850	212	203	95.75%
1851–1860	344	334	97.09%
1861–1870	340	331	97.35%
1871–1880	591	579	97.97%
1881–1890	977	951	97.34%
1891–1900	1,719	1,678	97.61%
1901–1910	2,782	2,697	96.94%
1911–1920	3,064	2,986	97.45%
1921–1930	5,948	5,811	97.70%
1931–1940	6,361	6,168	96.97%
1941–1950	8,063	7,815	96.92%
1951–1960	14,763	14,322	97.01%
1961–1970	38,044	36,930	97.07%
1971–1980	41,378	40,223	97.21%
1981–1990	44,399	43,245	97.40%
1991–2000	50,224	49,037	97.64%
2001–2010	40,485	39,635	97.90%

We recognize that the bibliographic inaccuracy factor is rather specific to this context. Our team concentrated on cases in which the record refers to a discernibly different item than that to which it is attached. Many programs make decisions based on record analysis, not by examining the books themselves—not only when making retention commitments, but also for mass withdrawal decisions. Cases in which there is a difference between the item and the record can result in fewer copies retained than anticipated. For example, if one decides to retain a book based on its record and the item associated with the record is not the desired book, the book will be retained but does not serve its intended role.

We did not consider instances in which poor record quality inhibits good matching. Although poor record quality—such as incomplete records, typos, and missing information—complicate shared print efforts by making record matching difficult, it does not increase the risk of loss. If anything, poor quality records may make it appear that there are more unique titles than actually exist, giving an inaccurate sense of scarcity. Moreover, a falsely unique copy associated with a poor-quality record is, in fact, another retained copy of a different title, if at some point it can be properly identified with that other title.

In the fall of 2019 we performed a study to evaluate bibliographic inaccuracy in this specific context of retention for a shared print collection. Because resource sharing departments look closely at the items they are pulling to ensure they correctly match the request, we asked libraries to track bibliographic errors while processing resource sharing requests in 2019. We received valid results from thirteen libraries for a total of 29,630 requests (each request was for one item) and found an overall 0.1% error rate. This is actually a conservative (high) estimate considering that most of the errors reported did not contribute to confusion about the object in hand. Author and title normalizations were commonly identified as differences. Publication date variances within a year or two were also common and usually did not have separate records in WorldCat. We did not categorize the results by publication date or language, so it is possible that earlier printed books, or books from particular geographical areas, may show higher rates of error.

Michaels and Neel's study of Indiana's collection mostly supports our findings.<sup>23</sup> Although their analysis of catalog records had a different focus than our study, Michaels and Neel performed an in-depth evaluation of Indiana University's collection. They found that 0.54% contained a cataloging error. The record error rate we found is significantly lower than Indiana's findings, but there are reasons for the differences. Over half of the Indiana errors were caused by incorrect home locations. Incorrect barcodes also made up a significant portion of the errors. Incorrect locations and barcodes are inconvenient, but they would not lead a person to identify a substantially different book than what is described in the record. Michaels and Neel only found a handful of these types of discernable catalog errors. Incomplete records were more commonly found than discernable catalog errors that would result in a complete mismatch between the item identified in the record and the book that is physically owned.<sup>24</sup> In practice, incomplete records may not contribute significantly to the risk in our model due to the aforementioned issues where poor-quality records may give an erroneous sense of scarcity. Because of the differences with which Michaels and Neel defined catalog errors, their study does not appear to contradict our 2019 study finding of a 0.1% bibliographic error rate.

Michaels and Neel also found that the confidence in the record accuracy is much higher for items in off-site storage because of common processing practices. Our data suggest that an inaccuracy rate of 0.1% is a conservative (high) estimate for books in library stacks, so a 0.0%

bibliographic inaccuracy rate could appropriately be applied in our model if the collections being analyzed are managed in off-site storage.

To recap: for our analysis we use 0.1% bibliographic inaccuracy—the risk that an error in the bibliographic record would lead to an assumption that the library owns a specific title that it does not in fact own—for items in the stacks, and 0.0% for items in off-site storage. The model is based on the assumption that bibliographic inaccuracy errors affect the calculation for survival only at the point of selection for retention; the record does not become progressively less accurate over time.

### ***Factor 3: Annual Loss Rate***

The annual loss rate may be the least intuitive factor of the group. Our experience is that books are lost every year, especially during circulation. In reality, what is lost annually is a very small percentage when put in the context of the collection as a whole. Often a library will replace books that are known to be lost from circulation or irreparably damaged (from a modest water leak, for example) when possible. While we have not found data that suggest a quantifiable number for annual loss, we have included a 0.01% annual loss in the stacks. We feel this number could be the upper echelon of what may be lost annually on top of the probability that an item is not on the shelf at the start of the analysis (see Factor 1). This loss rate, one book lost for each 10,000 books in the collection annually, is most likely much higher than what the average research library experiences each year.\* Because this is an annual loss rate, the probability of loss compounds over time.

We assume the annual loss for items in storage is near zero,<sup>†</sup> although our model can be modified to accommodate any suitable loss rate. While most materials in high density storage are not in a dark archive, they are generally used at a lower rate than on-site materials. Because of the regular tracking and types of processing performed for materials in storage, it is exceedingly rare that items are not returned or go missing on the shelf. Controlled retrieval also makes libraries more comfortable using protective enclosures, restricting use within a library, or limiting access to supervised areas. Restricted use does not automatically preclude the materials from being included in shared print programs, as some such programs allow the inclusion of materials that can be loaned to a library for use on-site even if a patron cannot take the items home. Many high-density storage facilities report that requested items are always found. Very few items are not returned to storage facilities after use.

Note that the annual loss rate applies regardless of the cause of the loss. This factor lumps together any permanent loss of the whole volume: not returned from circulation, destroyed by water, fire, or earthquake, accidentally dropped down an elevator shaft, or ripped up by vandals. It includes only the lost copies the library does not replace (whether it cannot or chooses not to) and for which a substitute commitment from the shared print consortium is not identified.

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\* To aid comprehension of what “one book lost for each 10,000 books in the collection” looks like, consider these two examples. For a modest library holding one million volumes, that loss rate calculates to 100 volumes lost every year that are not replaced. For a large library holding 10 million volumes, that loss rate represents 1,000 volumes lost every year.

<sup>†</sup> Because of its shared print program, ReCAP has tracked incidents at the facility or during circulation since January 2019. As of March 2022, there are nearly 17 million items in ReCAP’s facility. While uses were down because of the COVID-19 pandemic, about 509,000 uses occurred between 2019 and March 2022, and ten items were damaged beyond repair. This calculates to about one loss per year for every 5 million items in the facility (0.00006%) or about 1 loss for every 50,000 uses (0.002%).

To recap: for this model we use an annual loss rate of 0.01% for books in open stacks and 0.0% for books in storage. The rate compounds over time (annually); the potential impact of this loss grows larger if the time horizon selected for the preservation of the title is longer.

#### ***Factor 4: Physical Deterioration Over Time***

In contrast to the annual loss rate above, physical deterioration over time leads to the gradual loss of usability of books. The book may still be on the shelf, but at some point it may become too deteriorated to circulate, read, or scan. Physical deterioration stems from two broad causes: physical wear and tear, typically from use but also from other physical forces, water, pests, and the like; and from chemical deterioration, which is largely influenced by paper composition and storage environment, specifically light, temperature, and humidity. Unlike the On Shelf probability, which reflects a one-time event when lost, physical deterioration happens gradually over time.

We capture physical deterioration via a probability of usability curve. The first point on that curve is an estimate of the probability of usability of the book at the time of analysis (without inspecting it at the shelf) that reflects the sum of the book's experience in the past. Starting at this value, the probability of usability declines with time, forming a probability of usability curve. The shape of that curve depends on storage conditions, including temperature and relative humidity of the storage environment.

Little published research has quantitatively documented the general usability of library collections, especially over time.\* While we know paper degrades along a non-linear curve, it is not a given that paper degradation has a direct correlation to book usability. For our model we needed a way to determine the probability that a book is usable without actually inspecting it on the shelf, a process that is too labor intensive to be practical for large collections.

To complete the EAST Validation study, libraries' staff and student workers assessed over 316,000 books on the shelves at over fifty libraries; among other data points, they recorded the books' current condition.<sup>25</sup> Library staff were asked to mark items as being in excellent, acceptable, or poor condition. Poor condition was selected if the book exhibited one of the following criteria:<sup>26</sup>

- Cover
  - Obvious water or other damage
  - Unattached or loose covers
  - Dirty or sticky residue
  - Need to wash hands afterwards
  - Major fading of color
  - Obvious dye discolorations
  - Significant markings
- Pages
  - Full of markings
  - Some pages not legible

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\* In the 1980s and '90s many research libraries conducted preservation surveys of their collections. A systematic review of these surveys might provide useful data for our model, but there are problematic limitations: many focus specifically on acidic and brittle paper, which may not accurately correlate with usability; many record condition, but do not distinguish between remediable and irremediable damage; most are sampling surveys with a sample size that is too small to derive meaningful conclusions about subsets of material (e.g., by age); and most are one-shot surveys that do not record continued deterioration over time. Most of these surveys are unpublished internal documents.

- Torn pages beyond repair
- Have folds and creases that cannot be straightened
- Obviously missing pages
- Spine
  - Spine is broken or almost broken
  - Residue from spine glue falls out in flakes
  - Pages have come off spine

We decided that categorizing the items labeled “poor” in the EAST study as “unusable” offers a reasonable approach for estimating a usability curve over time. The EAST study’s definition of poor condition is broader than a practical definition of “unusable.” All truly unusable items would be captured in the poor category, but many items in the poor category may well be usable: for example, items requiring the user to wash hands after use, exhibiting dried out glue residue, or other categories describe damage that may be repairable. However, these criteria overall describe volumes that are not fit for circulation as is. Applying these criteria for poor condition as equivalent to “unusable” may be overly cautious, but we decided it was better to be conservative, considering how the definition is applied for our purpose. Usability is subjective and, to the best of our knowledge, there is no other available data that span so many books across multiple libraries.

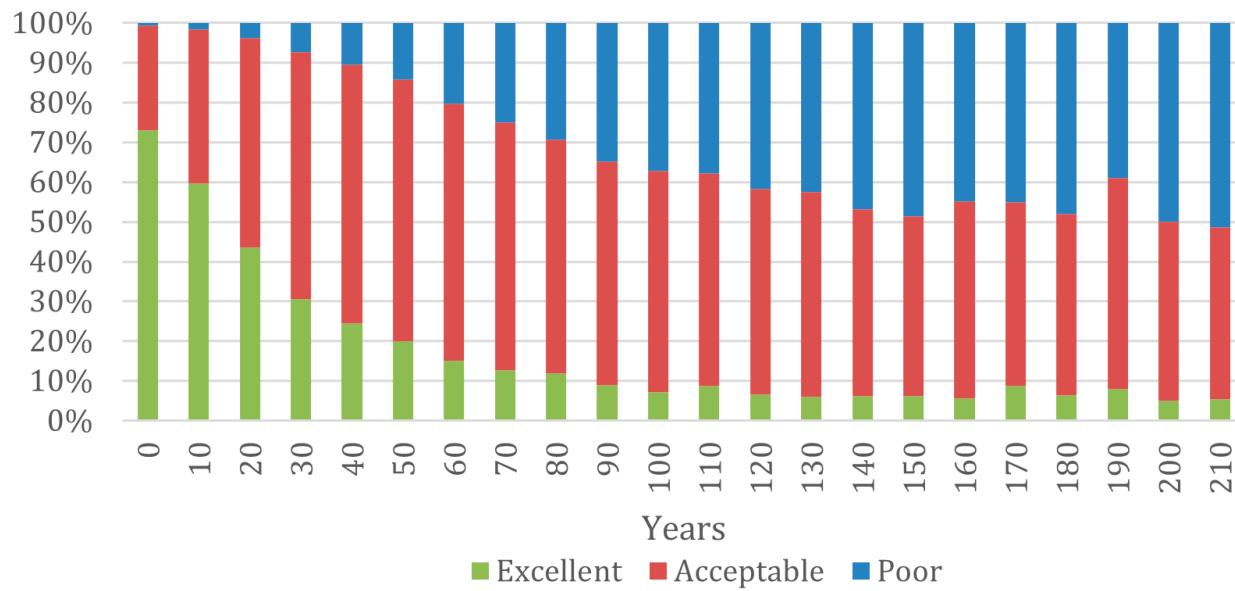
We used unpublished raw data from the EAST condition assessment to create a graph that shows an approximation of a general (un)usability curve (figure 3). We grouped books in decade-long buckets based on when the books were assessed. Books published from zero to nine years from the assessment were grouped into the zero-year (just published) bucket, books published from ten to nineteen years from the assessment were grouped into the ten-year bucket, and so forth. Consequently, our categorization leads to a slight underestimate of the condition levels of the book, erring on the side of conservatism vis-à-vis risk. The chance that an item is in poor condition increases quickly as it ages until about the 100-year mark, where it starts to level out. About 50% of materials around 150 years old are in poor condition. This curve is similar to paper degradation curves, discussed below, and supports an assumed relationship; although the structural damage may not be visible, loss of molecular weight in paper and paperboard occurs rapidly in the first twenty-five to fifty years, then levels off to a slowly declining long tail.

There are a couple of points worth making. Paper production changed substantially from rag to wood pulp around 1870 and again from acidic to alkaline processes around 1990.<sup>27</sup> These significant historical events could impact the usability curve projecting forward. We think the impact of the change to wood pulp on the usability curve is minimal, considering that the curves are fairly flat for ages of 150 years or greater. The assumption is that the usability curve for books aged 0 to 150 years is captured in this data, after which there is little change.<sup>†</sup> The impact of the change in paper manufacturing from acidic to alkaline processes in the late twentieth century is more challenging to estimate: books of this vintage simply

<sup>†</sup> The number of items in the EAST study drops with increasing age. This is not surprising considering the history of publishing and library collecting, but it does mean that there are relatively few items, less than 500 in total, published in the first half of the nineteenth century included in the study. Because of the decreasing population tested with greater age, the data for each of the early decades has less statistical accuracy. We smoothed the curve after 150 years to 50% usable. The statistics from the EAST data technically rose and fell, although there is no reason to believe that an individual book’s usability would ever increase over time. We assume the variability for 160- to 210-year-old books in the EAST data is due to low confidence because of small sample size, and the prevalence of rag paper during that time period.

**FIGURE 3****Data from the East Validation Study Set Out to Show the Percentage of Books in Excellent, Acceptable, and Poor Condition, by Age of Book**

(Sara Amato and Susan Stearns, "Documenting the Stewardship of Libraries: The Eastern Academic Scholars' Trust Validation Sample Studies," *Collaborative Librarianship* 10, no. 3.4, 2018, <https://digitalcommons.du.edu/collaborativelibrarianship/vol10/iss3/4>)

**Fraction of Books in Each Condition vs. Age**

have not been around long enough yet to develop a reliable usability curve. Our curve may overestimate the future degradation for these books, but overall that error will tend to reduce risk for these titles.

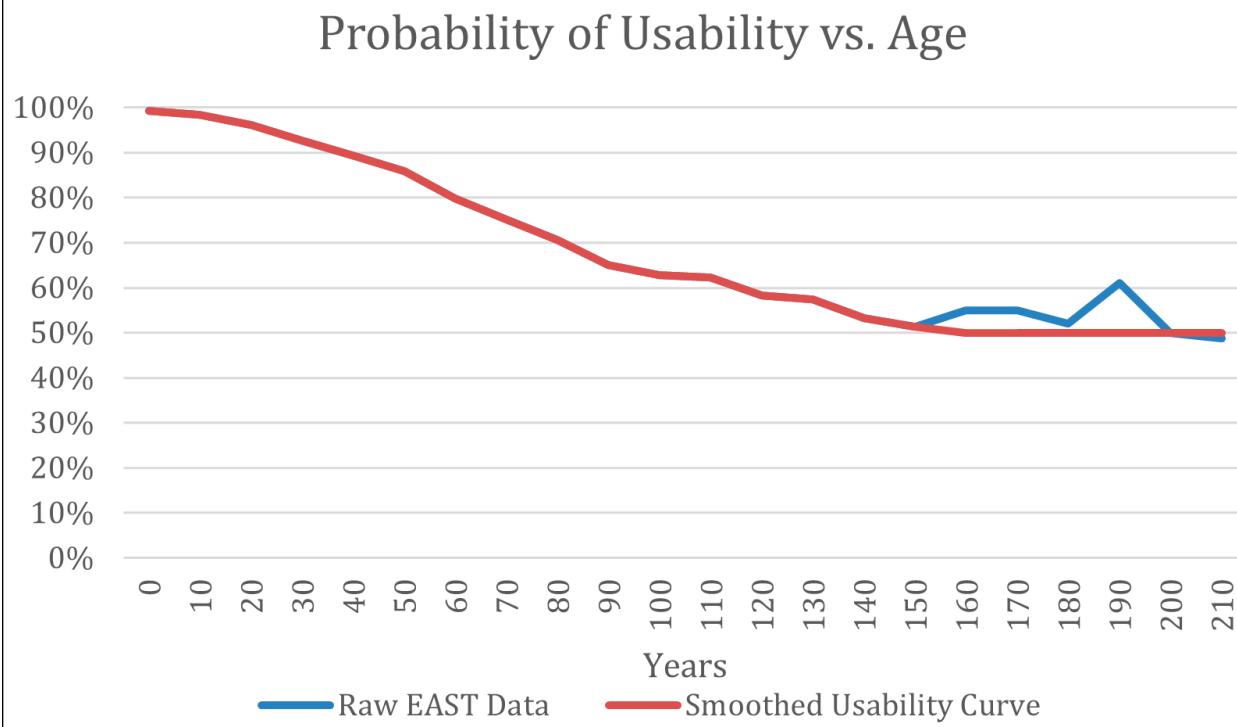
Using the data from the EAST validation study, we estimated the probability of usability as the ratio of the number of items in acceptable and excellent condition in an age interval to the total number of items in that age interval (figure 4). From these estimates for each decade-long age interval, we constructed usability curves that reflect the degradation of usability over time, applying some smoothing to eliminate irregularities.

Tétreault, Bégin, Paris-Lacombe, and Dupont provide more nuances on paper decay.<sup>28</sup> The degradation of paper fibers starts essentially at production at a fairly rapid rate. After a period of time, the degradation curve levels out to a long tail. One can clearly see this shape in their graph in figure 5. The paper used in their study was Whatman No. 1 filter, a standard paper frequently used in paper research; it was artificially aged by subjecting it to elevated temperature and humidity. The degradation curve for 128-year-old paper still has some curvature, but the 200-year-paper shows a much more gradual decline over the next four hundred years. These curves are similar to the one formed by the EAST usability data suggesting that paper degradation and usability are indeed correlated.

Tétreault et al. go on to look at the impact of different temperatures and humidity condition for artificial aging (figure 6). Lower temperature and humidity draw out the degradation over a longer period of time; in other words, lower temperature and humidity slows down the process by reducing the chemical reaction rate.

**FIGURE 4**  
**Data from the EAST Validation Study Set Out to Show Probability of Usability  
 (Expressed as a Percentage) as a Function of Age**

(Sara Amato and Susan Stearns, "Documenting the Stewardship of Libraries: The Eastern Academic Scholars' Trust Validation Sample Studies," *Collaborative Librarianship* 10, no. 3.4, 2018, <https://digitalcommons.du.edu/collaborativelibrarianship/vol10/iss3/4>)

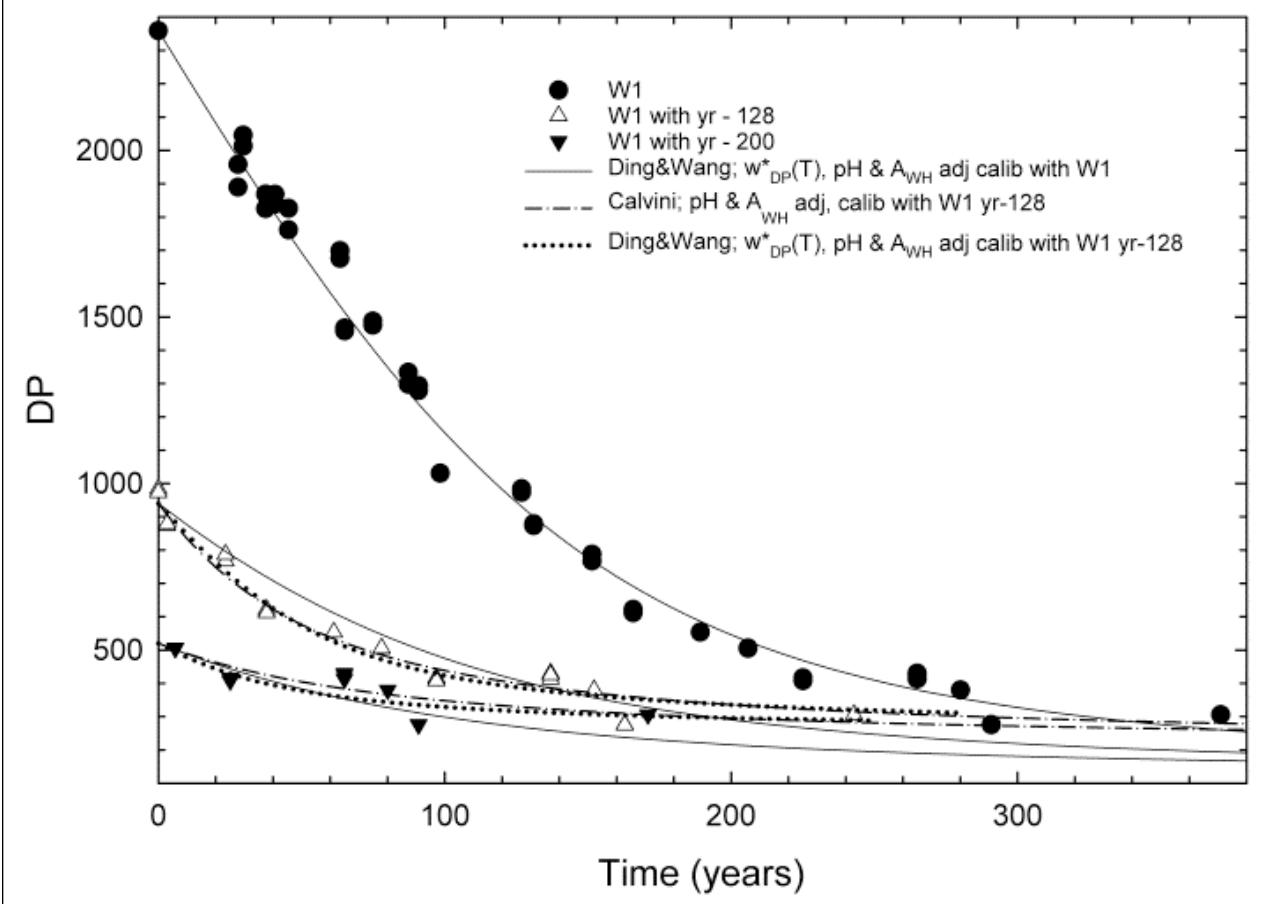


The effects of temperature and humidity on the chemical deterioration of library collections are well researched and documented. Both temperature and humidity significantly influence the decay curve. In general, higher temperatures and humidities will cause paper to degrade more quickly than lower temperatures and humidities. Michalski gave a clear general rule of thumb that each 9°F (5°C) drop in temperature doubles the expected life of many library materials, including acidic paper. Independently halving the humidity more than doubles the expected life of these materials.<sup>29</sup> The combined effect of reducing both temperature and humidity more than quadruples the expected life. These estimates are reinforced by the Image Permanence Institute's Dew Point Calculator (<http://www.dpcalc.org/>), an interactive tool where one can select different combinations of temperature and humidity and see the impact on four preservation metrics: natural aging, mechanical damage, mold risk, and metal corrosion.

In our analysis we need to account for both the current usability of a book at the time of analysis and the decline in usability in the future, which depends upon the future storage environment. We consider two storage environments: library stacks (assumed at ~72°F, ~45% RH) and lower-temperature, lower-humidity conditions typical of offsite storage (assumed at ~55°F, ~35% RH). Because storage facilities with high-quality environmental conditions are relatively new (Harvard opened the first purpose-built facility in 1986), we assume the current condition of books is as if they had been held in the stacks since publication. We determine the chance that a book is usable at the time of analysis by finding the book's cur-

**FIGURE 5**  
**Trend of Decay Curve Models Based on Experimental Data of Whatman 1**  
**Paper Aged in Closed Tubes**

In the graph, W1 refers to Whatman No. 1 paper, DP stands for degree of polymerization and  $A_{WH}$  is a factor that reflects the impact of hydrogen ions on paper aging. Reproduced with permission from J. Tétreault et al., "Modelling Considerations for the Degradation of Cellulosic Paper," *Cellulose* 26, no. 3 (February 1, 2019): 2013–33, <https://doi.org/10.1007/s10570-018-2156-x>.

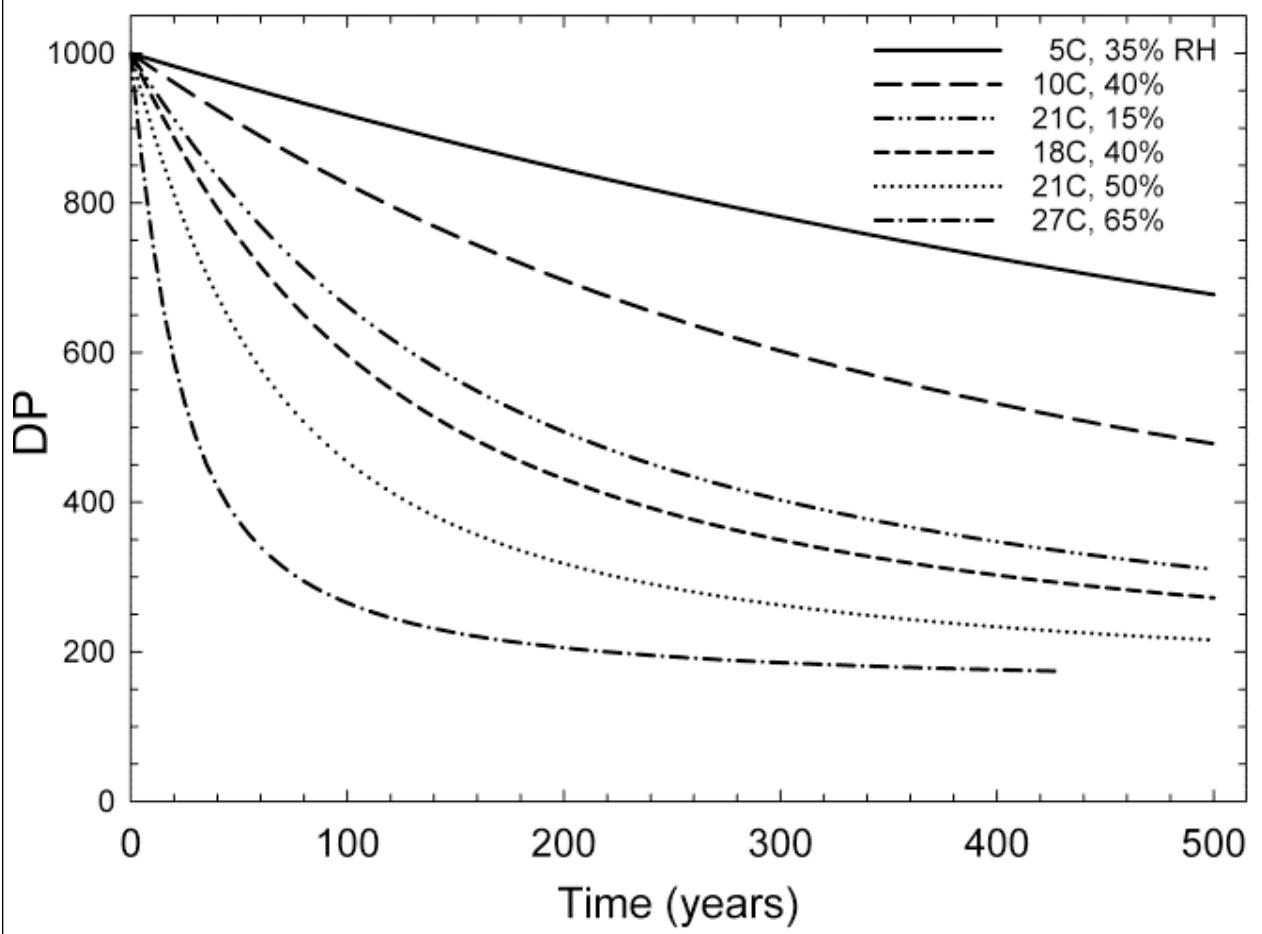


rent age on the EAST usability curve. Looking into the future, our usability curve splits into two alternative paths. If the book is held in the stacks, its usability continues along the same curve as estimated from the EAST data. If, however, the book is held in storage, the book's usability curve starts (again, at the time of analysis) at the estimated usability for the book of that age based on the EAST data but has a slower rate of decline. We assume that if a storage environment decreases the chemical degradation by a quarter, the degradation over the next 100 years will be equal to the effect of aging in the stacks for 25 years. The environmental improvement between storage and stacks more than quadruples the life expectancy of the book. The conditions may differ in real life situations, although any 17°F and 10% RH difference between stacks and storage should lead to similar results. The usability curves for books held in storage in the future depend upon the current age of the book; examples of a few curves are shown in figure 7.

We regard usability curves derived from the EAST data as worst-case scenarios because storage conditions going forward are expected to be significantly better than they were even forty or fifty years ago—even environmental conditions in stacks are far better. Therefore, the

**FIGURE 6**  
**Calvini Model Simulation: Decay Curve for Acidic W1 Papers**  
**in Stack Under Different Hygrothermal Conditions**

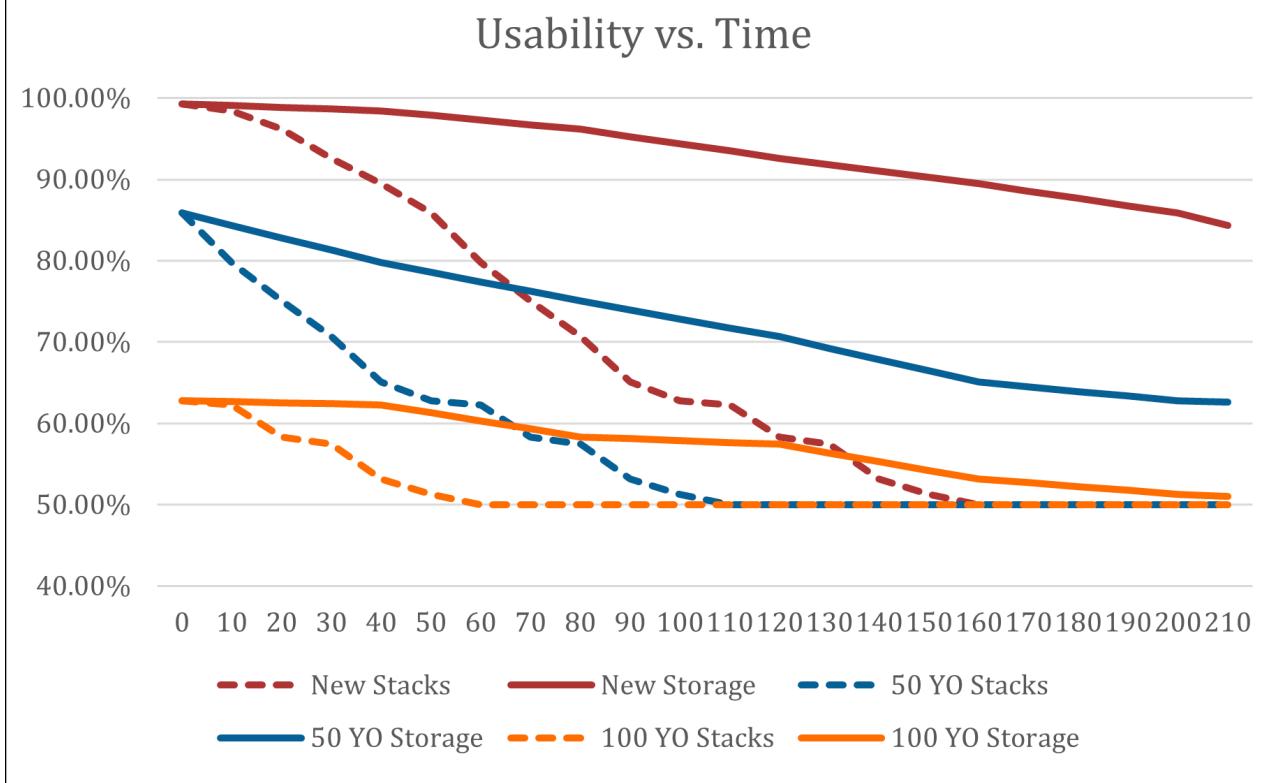
Reproduced with permission from J. Tétreault et al., "Modelling Considerations for the Degradation of Cellulosic Paper," *Cellulose* 26, no. 3 (February 1, 2019): 2013–33, <https://doi.org/10.1007/s10570-018-2156-x>.



usability curves that we utilize are also conservative (understating the probability of usability). Also, we acknowledge that the intended use of the physical items could influence the definition of usability and therefore also the specification of the probability that the item is usable at various points in time in the future. For example, a book containing only text may be usable, provided that the reader can make out the letters, but a book containing maps that is in a similar state of deterioration may be regarded as unusable.

To recap: our measurement for physical deterioration combines a calculation of the probability of usability at the time of analysis, based on the age of the book at that time, with estimates of further deterioration in the future, based on a combination of age and storage environment. The calculation for future decay is differentiated according to two options for storage environment: (1) typical conditions in library stacks and (2) typical conditions in off-site storage. For the model in the next section, we consider two commonly occurring types of storage, open library stacks (72° F and 45% RH) and typical off-site storage (55° F and 35% RH) without circulation restrictions. We note that our spreadsheet model is flexible and allows a user to input different usability curves, if needed.

**FIGURE 7**  
**Usability Vs. Time for New, 50-Year-Old, and 100-Year-Old Books in Stacks and Storage**



## Applying the Model

### Calculating P1

We next provide a simple example to explain the essence of the calculations to determine P1 at a designated future point in time, which we refer to as  $T$  in the discussion below. This is followed by the development of a general formula. Recall that a book will not exist and be usable at some future point in time if any of the following is true: (1) it is not on the shelf at the time of analysis and therefore assumed not to be on the shelf at time  $T$ ; (2) the bibliographic record is inaccurate at the time of analysis, so what we believe to be a specific book is, in fact, another book; (3) the book is lost between the time of analysis and time  $T$ , which depends upon storage security and the elapsed time; (4) given the condition of the book at the time of analysis and the degradation until time  $T$ , the book is anticipated to be unusable at that point, which depends upon the quality of storage conditions and the elapsed time.

The probability that the book exists and is usable at time  $T$  is the probability that none of these conditions is true. We assume that each of these categories of conditions occurs independently of one another, which may not be technically accurate. For example, the on-shelf rate and the bibliographic inaccuracy may be correlated, with both rates being higher for older books. However, the impact of loss and degradation tends to be far greater than the on-shelf rate or bibliographic inaccuracy for time durations of interest, e.g., 50 or 100 years, as we explain in more detail later. If one is concerned about potential adverse correlations, one option is to overstate the risks when choosing numbers, which will lead to conservative choices about the number of book copies to retain.

We now present a numerical example. To keep the exposition simple, we will assume  $T=50$  years is selected in advance and all numerical values are selected consistently with that  $T$ . The scenario for our example, a group of five copies of one title, is described below, with numerical values chosen so as to avoid confusion:

- On-shelf probability: 97% in library stacks and 100% in storage
- Bibliographic inaccuracy rate: 0.1% in library stacks and 0.0% in storage
- Three books in very good condition (90% probability of being usable) and stored in off-site storage with good environmental controls; physical loss probability of essentially 0.0% per year and degradation (reduction in probability of usability) down to 70% probability of being usable at time  $T$ .
- Two books in excellent condition (100% probability of being usable) and stored in library stacks (less secure storage and weaker environmental controls); physical loss probability of 0.01% per year and degradation down to 60% probability of being usable at time  $T$ .

Although it would not be common to have copies of the same title that we know to be in different conditions (calculated on the basis of age) at the start of the planning horizon, if there were two printings of the title, with the original occurring about twenty-five years ago and another occurring very recently (and assuming we do not treat them as distinct titles), then we would expect copies of the original printing to be in very good condition and the recently printed copies to be in excellent condition. However, for the purposes of our example, what is important to distinguish is that the two sets of books will have different levels of usability at time  $T$ . This may be a consequence of starting out in different conditions, being stored in different conditions in the future, or both.

Considering only the physical loss for a book stored in library stacks, the probability that it is not lost after one year is  $1 - 0.0001$ , so the probability that it still exists at  $T = 50$  is:

$$(1-0.0001)^{50} = 0.995$$

Incorporating the other factors for one of the books stored in library stacks, the probability that it exists and is usable at  $T = 50$  is:

$$(0.97) * (1-0.001) * [(1-0.0001)^{50}] * (0.6) = 0.5785 \text{ or } 57.85\%.$$

The expression in the first set of parentheses represents the probability that the book is initially on the shelf and that in the second set of parentheses is the probability that the bibliographic record is accurate. The expression in square brackets is the probability that the book has not been lost after 50 years, and 0.6 is the probability the book is usable at  $T = 50$ .

Analogous calculations for a book stored in off-site storage with good environmental controls is:

$$(1.00) * (1-0.000) * [(1-0)^{50}] * (0.7) = 0.70 \text{ or } 70.0\%.$$

Each book has a probability of 70.0% or 57.85% (depending on storage type) of existing and being usable at  $T = 50$ . The probability that at least one of them exists and is usable at  $T = 50$  is simply 1 minus the probability that all five of them do not exist and/or are not usable at  $T = 50$ , which is equal to:

$$1 - [(1 - 0.70)^3] * [(1 - 0.5785)^2] = 0.9947 \text{ or } 99.47\%.$$

In essence, we determine a value such as 0.70 or 0.5785 for each individual book at time  $T$ , and from these values calculate the probability that at least one of them survives and is usable at that time.

We have chosen realistic or somewhat realistic numerical values for this example. Even from this simple example, it is clear that the decline in the probability of usability is a dominant factor.

We now develop a general formula for P1. To do so, we distinguish copies of a book title by the combination of their initial probability of usability (at the time of analysis) and their associated storage option, which we refer to as a type, indexed by  $i$ . Given this information on type  $i$ , we can read the following value from a table or graph of the corresponding usability curve:

$u_{iT}$  = probability that any given copy of a book of type  $i$  is usable at time  $T$ , assuming that it exists.

Additional notation is defined as follows:

$\alpha$  = on-shelf probability

$\beta$  = bibliographic inaccuracy rate

$\gamma$  = annual loss rate

$n_i$  = number of copies of type  $i$

$N$  = number of types

$T$  = retention horizon.

We can now express  $p_{iT}p_{iT}$  = the probability that any given copy of type  $i$  exists and is usable at time  $T$  as:

$$p_{iT} = \alpha \cdot (1 - \beta) \cdot [(1 - \gamma)^T] u_{iT}$$

Then, P1 can be expressed as follows:

$$P1 = 1 - [(1 - p_{1T})^{n_1}] \cdot [(1 - p_{2T})^{n_2}] \dots$$

$$1 - [(1 - p_{1T})^{n_1}] \cdot [(1 - p_{2T})^{n_2}] \dots [(1 - p_{NT})^{n_N}] [(1 - p_{NT})^{n_N}]$$

Note that each bracketed term is the probability that no copies of type  $i$  exist and are usable at time  $T$ , and the product of the bracketed terms is the probability that no copies of any type exist and are usable at time  $T$ .

Our spreadsheet version of the model accommodates books with different initial usability estimates (probabilities) and different degradation trajectories. In the spreadsheet, we calculate a trajectory of these values for user-selected time grid points (e.g., multiples of a decade) up to time  $T$ .

## ***Running the Model and Interpreting the Results***

There are two major dimensions of specifying acceptable loss. The first is the selected time horizon,  $T$ ; the second is the acceptable probability of loss over that time horizon,  $P_1$ . We discuss each of these in turn. We selected 50, 100, 150, and 200-year time horizons for analysis because collection managers may desire different planning horizons for books of different ages or importance. The spreadsheet model is flexible and allows consideration of any user-selected time horizon, but we decided not to model horizons shorter than 50 years because we wanted to avoid being too myopic and thereby understating true retention requirements.

Choosing the minimum acceptable probability of survival,  $P_1$ , is also critical. The spreadsheet model will calculate the probability of at least one surviving copy at the end of the specified time horizon using the given inputs (including the number of copies in each type of storage), but determination of whether that probability is acceptable rests with the collection decision-makers. We report results for a probability of survival of at least one copy ( $P_1$ ) of 99.8%, i.e., a loss of 1 title in 500. We chose this value because it specifies a high level of risk protection while avoiding, in most cases, the need to retain additional copies that provide very small marginal returns in terms of risk reduction.

Setting acceptable values of  $P_1$  and time horizon is necessary but the value of  $P_1$  says little about what occurs after we reach the horizon. Once the selected horizon is reached, there will be fewer copies and books will have aged. Libraries may not be able to achieve the same value of  $P_1$  for additional decades if they pare down to the minimum number of copies needed to reach their first milestone. After all, not only will some titles be fully lost at this point, but also the rest will have at least, but possibly no more than, one usable copy.

The calculations in the results that follow are based on the following scenario, where the selected values are based on studies described earlier:

- on-shelf probability: 97% for books in the stacks and 100% for books in storage
- bibliographic inaccuracy: 0.1% for books in the stacks and 0% for books in storage
- annual loss rate: 0.01% for books in the stacks and 0% for books in storage
- usability trajectories as described in the subsection on Physical Deterioration over Time.

All of the parameters mentioned above were selected to be conservative, i.e., loss or unavailability rates are slightly overstated relative to what available studies indicate. However, they do not explicitly account for rare events that may lead to catastrophic losses. In the subsection on Natural Disasters and Geographic Diversification later in the paper, we explain how such events can be accounted for in an approximate way, and other measures that can be taken to mitigate the effects of such rare events.

We used the model to identify the smallest number of copies of a title needed to ensure a 99.8% probability of survival of at least one usable copy for books of different initial ages at the beginning of the scenario (new, 50 years old, and 100 years old), assuming they were stored in the stacks up to year zero and that future storage of all copies would occur in either off-site storage or library stacks (not a mixture). As mentioned above, we utilized the probability of usability curves as described in the subsection on Physical Deterioration over Time. We note that data on the condition of books older than 150 years is sparse; we have specified degradation trajectories that we believe are conservative, reflecting a smaller probability of usability than what we anticipate will be true at each time grid point.

With the aforementioned estimates, using a range of retention quantities, we calculated survival probability of the title for books of age 0, 50, and 100 years at the time of analysis and

for retention horizons of 50, 100, 150, and 200 years. These values are shown in Appendix A. From these values, we gleaned the minimum retention requirement, i.e., the smallest number of copies that would ensure a 99.8% probability of survival for each scenario (age of book, storage environment, and retention horizon). These values are shown graphically in figure 8 and numerically in table 2.

We make a few observations based on the results shown in the graph. First, if the books are held in the stacks and the retention horizon is long (150 years or more), the current age of the book has little impact on the required number of copies; 10 copies will be needed. Second, if the copies are held in storage, then the minimum retention quantity is sensitive to both the age of the book and the retention horizon.

Third, the reduction in the number of copies needed if the books are moved from the stacks to storage is often greater for newer books, particularly for retention horizons of 100 years or more, because the payoff for higher-quality storage conditions is significantly greater during an item's first few decades of life. This may, at first, seem counterintuitive

**FIGURE 8**  
**Number of Books Required to Achieve 99.8% Probability of Survival of at Least One Usable Copy**

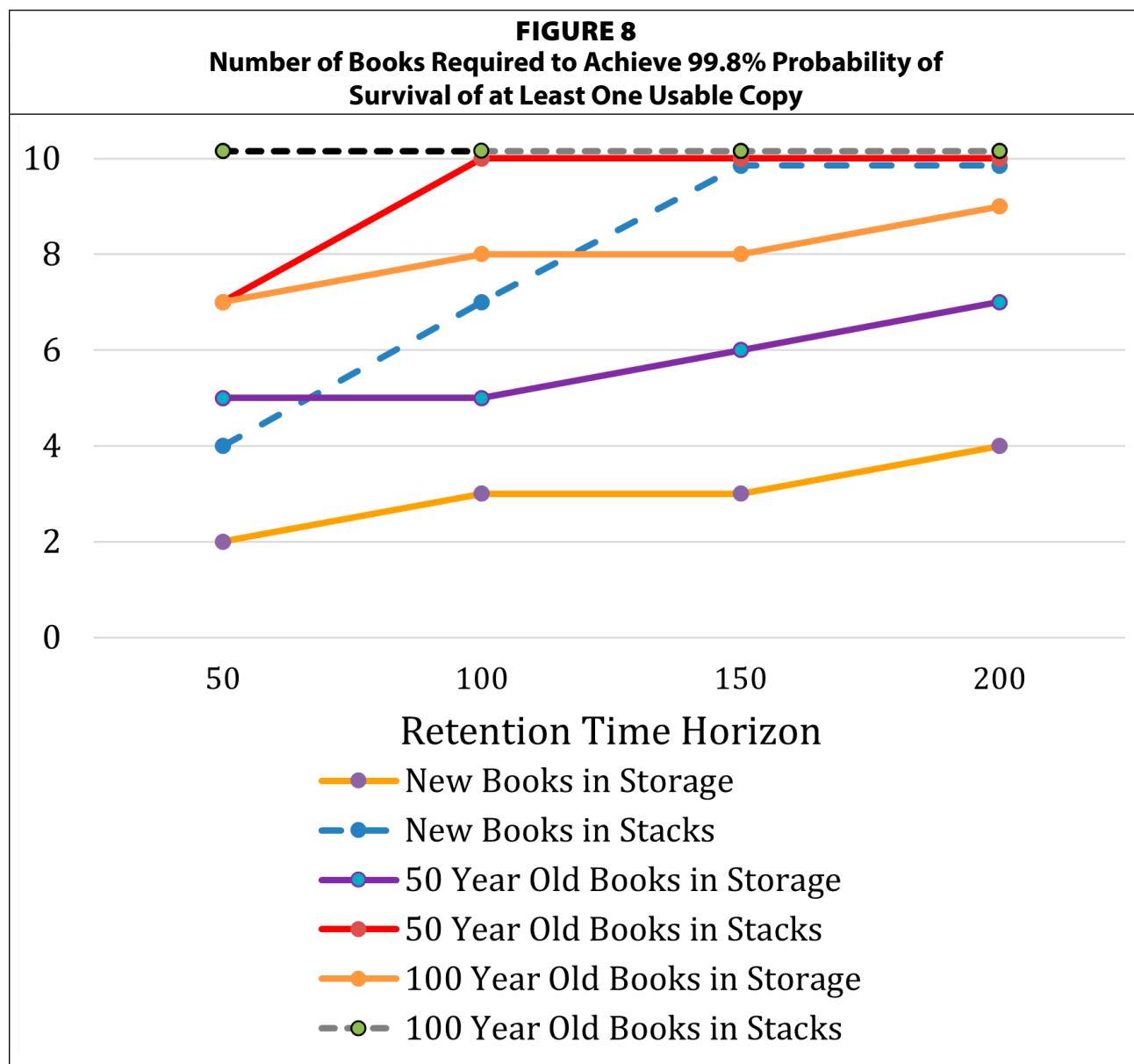


TABLE 2 Number of Books Required to Achieve 99.8% Probability of Survival of at Least One Usable Copy							
Storage Condition		Stacks			Storage		
Age of Books at Start, in Years		0	50	100	0	50	100
Retention Horizon at Start, in Years	50	4	7	10	2	5	7
	100	7	10	10	3	5	8
	150	10	10	10	3	6	8
	200	10	10	10	4	7	9

because one might be inclined to store older books in higher-quality storage. This strategy is sensible for scarce titles because the number of available copies is already so small—perhaps only one—and special preservation efforts may be needed to protect the title from complete loss. However, books that are already 100 years old or more have already experienced a large portion of the possible chemical deterioration. The impact of placing those books in higher-quality storage is diminished compared to placing new books in high-quality storage, which significantly slows down the deterioration at a time of a book's life when most of the deterioration occurs. Although placing old books in high-quality versus lower-quality storage does not help as much as we might hope, the analogous reduction in the retention requirements for old books is still significant, up to five copies (for fifty-year-old books and a 100-year retention horizon). These reductions may be quite meaningful, especially when the number of extant copies is small.

Up to this point, we have considered books of several different ages and several retention horizons, and from our results decision-makers can identify minimum retention numbers that apply to their situation. We now take a different perspective and ask how many copies are needed if the goal is to reach P1 of 99.8% at the time a title reaches its 150th birthday, which we think is a reasonable way to view the decision problem, as such a goal is not too myopic and is within the realm of feasibility. From the information in figure 8, we find the following minimum requirements:

- For books in the stacks with a retention horizon of 150 years less the age of the book (i.e., if the collection manager wishes to achieve a high survival probability of each title to age 150): ten copies would be required whether one is concerned with 100-year-old books and a 50-year horizon or 50-year-old books and a 100-year horizon or new books and a 150-year horizon.
- For books in storage with a retention horizon of 150 years less the age of the book: three for new books, five for 50-year-old books and seven for 100-year-old books.
- A mix of books in stacks and in storage could suffice. For example, if there are fewer than ten copies of a book available but not all can be moved to storage, a mixed-storage arrangement may provide adequate coverage. For example, two copies in storage and six copies in the stacks will suffice for 50-year-old books.

Because retention quantities must be integers, some changes, particularly small changes, in parameters may have no impact on the minimum retention quantity. In our model, there are some factors that inflict a one-time “hit” on the survival probability of a copy of a book, namely the on-shelf probability and the probability of bibliographic inaccuracy. The annual loss rate, on the other hand, has a compounding effect over time. With the small, yet possi-

mistic, rate of 0.01%, the effect of compounding is modest, but one should be careful about the effects of compounding over long horizons even if the annual loss rate is 0.1%. The most important factor in our model, however, is the probability of usability, which, as an example, would be only 63% at a time horizon fifty years from now for a book that is currently fifty years old and will be held in the stacks. This effect dominates that of the one-time effects of bibliographic inaccuracy and not-on-shelf probability.

### **Factors Not Included in the Model**

Above we discussed the risk factors that are included in our calculation of the probability of survival of book titles. Other risks also tend to be raised both in the literature and informally when exploring the topic of factors impacting book retention. In order to gain a better understanding of these additional factors of concern for librarians, the authors both reviewed the literature and met with several advisory panels in fall 2021 and winter 2022. It is important to tease out these “top of mind” issues in order to examine their likelihood of impacting our targets and our ability to calculate the probability of survival of a title in a way that incorporates all important factors.

### ***Natural Disasters and Geographic Distribution***

When assessing potential risks to books, we decided to include in our model only factors that could be quantified from available data. Natural disasters are a good example of a risk that is challenging to quantify in this context. Major disasters do occur in libraries, but not frequently enough to reduce the overall number of copies of a given title in a significant way. (Natural disasters may be devastating to collections of unique items, but that scenario is outside the scope of this model.) Moreover, while several organizations track natural disasters that impact cultural organizations—such as the Federal Emergency Management Agency (FEMA), the Heritage Emergency National Task Force (HENTF), and the American Institute for Conservation National Heritage Responders (NHR)—they record incidents in libraries, archives, and museums but not the numbers of volumes lost. Anecdotal reports from insurers of library collections suggest that losses exceeding deductibles are very rare; in other words, that losses have been low when put in context of a library’s entire collection.

Still, there may be a good reason to account for the likely increase in adverse weather events. Climate change is predicted to increase the number and severity of weather events.<sup>30</sup> It is difficult, however, to estimate the chance that these events will lead to a significantly greater number of lost copies stored in specific locations. The eastern and southern coastal regions of the U.S. have seen an increase in hurricanes, and are predicted to experience more. The West Coast is prone to earthquakes and is overdue for a large one. About 55–60% of U.S. library collections are held in these regions.<sup>31</sup>

While it is unlikely that a single event, or even multiple events in a given time period, would destroy all of the collections in an area, it is possible that significant losses will occur over time. The impact of events could be higher as collections are consolidated in relatively few locations. Even if we assume that libraries will continue to adapt and improve preventive measures and preservation emergency response capabilities, there may be a threshold that calls for major revision of how shared print archives are planned and managed—including a thorough revision of the numerical values that serve as input to the calculations of our cur-

rent model and possibly an extension of the model to account for catastrophic risks explicitly. Meanwhile, striving for geographic distribution for storage of the retained copies of a title is a recommended best practice. Options might include intentionally making retention commitments for copies held at different institutions, at different campuses of the same institution, or even at different locations within one institution.

To account for natural disasters in the current model, the numerical loss rate that we (and other users of the tool) specify may include additional buffers, i.e., increasing loss rates to account for these additional risk factors. When doing so, one may be tempted to focus on infrequent catastrophic events, but even catastrophic events such as major earthquakes have a low probability of leading to any losses, sometimes due to loss mitigation efforts, so it is important to use realistic numbers. Because our spreadsheet model is intended to be used for time horizons of at least 25 years and more typically 50 or 100 years, one way to incorporate the effects of disasters that occur sporadically is to estimate the probability that a typical item will be lost over a horizon of 25, 50, or 100 years owing to all types of sporadic disasters that one wishes to include, and convert these to annual rates. For example, suppose it has been estimated that there is a 75% chance of a 7.0 magnitude earthquake during the next thirty years on a certain fault in California. This translates to 2.5% per year (or perhaps 3% or 4% if one wants to add a cushion). We would multiply this by the probability that such an earthquake would cause a typical book to be lost or irreparably damaged, which might be (for the sake of this example) 0.1% for a library situated on top of the fault (a loss of 1 book out of 1,000 in that library). We could then attribute a loss rate of  $2.5\% \times 0.1\% = 0.0025\%$  to such earthquakes and repeat this process for other types of sporadic disasters. We can then add the annual loss rates from sporadic events to those due to more common, regularly occurring events, and finally use an adjusted annual loss rate that considers both common and sporadic events. If the annualized loss rate due to sporadic events is difficult to estimate, then one can include a buffer to be conservative. If the frequency or severity of sporadic events differs widely from one storage location to another, it is, in principle, possible to separate copies of books into finer-granularity groups and apply appropriate annual loss rates to each.

### ***Impact of Retention Agreement/Accidental Withdrawal***

The impacts of retention agreements and accidental withdrawal are also hard to measure. We recognize the significant importance of retention agreements and their implementation—for example, whether these commitments are made public, whether there are clear shared print memoranda of understanding, and whether withdrawal intentions of the parties to the agreements are specified.<sup>32</sup> But how can one measure the effect of retention agreements (or the lack of them) and put a number to it? Likewise, withdrawal decisions are intentional, but one cannot reasonably assign a value to the probability that a copy would be accidentally withdrawn. For these reasons, our model is based on the assumption that copies will be kept unless there is unintentional loss or irreparable damage. For all intents and purposes, the recommended number of copies from this model is synonymous with a minimum number of required retention commitments.

### ***Duplicate and Unique Copies***

Much has been written about how books should be compared when considering them as potential duplicates. In 2015 and 2016 Jacob Nadal, Andrew Stauffer, and Mike Garabedian

participated in a friendly debate in the pages of *Against the Grain*. Nadal started the thread describing the pressures for withdrawals and a methodology that he investigated at UCLA.<sup>33</sup> Stauffer eloquently continued the conversation, raising concerns about differences in copies that are not described in Machine-Readable Cataloging (MARC) records. As he says: “Any ‘fool’ can look at a spreadsheet of 500+ identical pieces of metadata and call the books they reference ‘duplicates.’”<sup>34</sup> Garabedian concludes the debate with an experiment where he estimates that it takes about ninety seconds to fetch and record information about books with the intent of comparing their conditions. He found that 31% had “paratextual” value such as original dust jackets, original paperback bindings, or facsimile paperback bindings.<sup>35</sup>

The debate over what Teper calls “sameness” is an important one, and one that she extends to differences in bibliographic data within the MARC record.<sup>36</sup> These are issues that are hotly debated and worth time and attention, but our intent in the present study is something different. Our model was not targeted to situations in which an individual item has significant artifactual value, such as significant marginalia or a distinct binding, that effectively makes it unique. We are attempting to provide guidance on what to do once a group of items has been identified as “the same.” Copies that need to be considered different are not part of such a group, but rather fully independent “things.”

Our model could be applied to unique items by treating such items as if each is a different title, but the utility of doing so is questionable. It is unlikely that two or more effectively identical copies exist, so the only decision may be whether to retain the unique copy and in what types of storage conditions. There could also be cases where an item could be both part of a group and unique. For example, a signed book has all of the text of the original, but also carries added value in the form of the signature. That copy may serve a dual purpose, an example of the generic title while simultaneously being a unique artifact. We note that although these unusual copies would not be regarded as part of the pool considered to aid in retention of the “standard” version of a book, they may nevertheless provide another backup of the contents.

## *Digital Copies*

The focus of this study is on physical copies; the existence or not of a digital surrogate has no influence on the calculation whether or not at least one physical copy will remain at the selected time horizon. On a broader scale, however, the existence of a digital copy may influence the management decision as to how much risk to the print title is acceptable.

There are several important reasons for retaining access to a print copy even after a digital surrogate has been created: as a source of information not captured (or not captured adequately) in the digital copy; as a source for rescanning if the digital copy is lost; as historical evidence of the original publication; to accommodate researcher preferences for reading and use; and for artifactual evidence that could be difficult to capture digitally.

Moreover, page-by-page validation of digitized copies is complex. Although significant improvements in validation have been implemented since the first forays into mass digitization projects, errors do slip through.<sup>37</sup> Retrospective validation of digital copies at scale by libraries is usually too resource-intensive to contemplate, so errors are discovered randomly when the title is accessed. One purpose of our model is to help libraries avoid a situation where no print masters of a title remain—regardless of whether a digital surrogate exists.

The existence of a digital surrogate may reduce physical wear and tear on the print original. While there is early research that says digitization may increase use of materials, especially

for special collections,<sup>38</sup> more recent analysis finds that the presence of digitized versions reduces circulation.<sup>39</sup> Interestingly, digitization may simultaneously reduce circulation and increase physical sales. Nagaraj & Reimers found that increased sales were most prominent with low use or little-known materials because of enhanced discovery. Well known or highly used materials did not experience increased sales.<sup>40</sup>

## Discussion

Developing the model and running analyses of examples with books of different ages and characteristics cast light on several questions about shared print collections and retention that we discuss more fully here.

### *Not Enough Copies*

Inherent in the concept of the on-shelf probability factor described above is the acknowledgment that some titles are already lost. Inherent in the annual loss rate and deterioration factors is the alert that the longer libraries wait to make decisions about retentions, the more titles will be lost.

Even if copies exist at the time of initial analysis, it is expected that some titles may not have enough copies available in libraries to meet the target probability of at least one usable copy remaining at the selected time horizon. In fact, it is precisely those books that need the most retained copies, older titles, that will have the fewest copies available.

In situations where it is not possible to combat the risk of loss by adding extra copies to the pool, other risk mitigation strategies must be deployed. Many of these are already established practice in research libraries: remove older and rare materials to offsite storage or a special collection, validate the existence of copies and the cataloging, apply enhanced preservation measures to stabilize the items and prevent future damage, and exercise tighter controls on circulation, or ensure the title has been adequately and completely captured digitally. Even in situations where it is possible to add extra copies to the pool, libraries and consortia that are making related decisions need to consider costs holistically: the cost of retaining copies of a book (e.g., storage space) and the equipment and energy needed to provide different quality levels of storage conditions, and the technology and labor to maintain better circulation controls. Such investments may lead to needing significantly fewer copies. The best strategy may be different for different portions of the collection.

Ideally, every title held in the national collective collection would be secured with an adequate number of retention commitments. It was estimated that in 2005 there were thirty-two million print book titles in WorldCat.<sup>41</sup> Many titles will not have enough coverage to attain the desired probability of survival of at least one copy until a designated time horizon, even if every copy is committed. Solving the problem of what to do with titles that cannot reach that target will require strategies to mitigate information loss. While outside the scope of this paper, further work should be considered such as digitization or other practices.

### *Dark Storage*

One recurring proposal for the long-term preservation of books is the creation of a dark archive: record-validated copies are placed in non-circulating storage for the entire desired time horizon and are removed only for special circumstances such as to correct digital surrogates.<sup>42</sup> This strategy reduces or eliminates many of the risks. The validation process eliminates the risk that the item might not be on the shelf and substantially decreases the probability that the

bibliographic record is inaccurate. Eliminating circulation reduces the risk of loss. An inspection process would allow for an exact determination of initial condition and usability as opposed to an estimated probability that an item is usable. Future chemical deterioration in a dark archive is similar to light archives as it is mostly influenced by the environmental conditions.

When choosing among alternative storage conditions to include in our analyses, we considered dark storage as an option, but from the discussion of risk factors above, it is evident that there are few differences between dark storage and a circulating collection in an environmentally optimized storage facility. Bibliographic inaccuracy would be 0% in both cases, as would the not-on-shelf rate. Likewise, assuming that the dark storage is in typical off-site storage conditions, the usability curves would be the same as for the storage conditions we used for the model. Given that we have assumed that the annual loss rate in off-site circulating storage is statistically zero (we use zero as an approximation), the annual loss rate for dark storage would be the same.\* In view of the fact that all of the risks are the same or essentially the same for dark and off-site circulating storage, we include off-site circulating storage explicitly, but the same results would apply to dark storage.

We note that circulation can in fact help the security of the collection. In closed stack and storage facilities, small pockets of damage—a water leak, pest incursions—are typically found when staff go into the stacks to retrieve items for circulation, and the damage can be mitigated before the problem spreads.

If one is interested in considering dark storage *at especially low temperature and humidity*, appropriate usability curves can be entered into the spreadsheet tool and minimum retention numbers recalculated.

A true dark archive may offer greater gains for serials than for monographs, especially since there have been concerted efforts to create digital backfiles of serial runs. Past use patterns for print serials make missing pages and physical damage to heavy bound volumes more common; serials benefit more from a thorough validation process (article or page level validation) at the point of transfer into the archive. Going forward, use for print serials—if they are used—is more likely to involve scanning (by library staff) of individual articles than circulation of whole volumes.

### ***Specialized Subcollections***

For the purposes of this paper, we utilized broad-based, generic averages. We are describing “average books” based on sufficient available data that helps us characterize them with a high level of confidence. In the shared print context, there are so many collections and groupings that it may be difficult to estimate the pertinent values for each possible subcollection—defined for example by language, subject, or circulation history. That being said, the model does indeed work on less typical cases, but one must determine the specific values to enter that pertain to that subcollection.

Adjustments could be made for collections that may have higher (or lower) inherent risk. Indeed, it is possible to apply the model on a title-by-title basis if enough were known about each numerical parameter, although the practicality and the value of doing so is dubious. Alternatively, the model facilitates what/if analysis, so ranges of possible values (of error and loss rates, for example) can be considered.

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\* See footnote above for actual estimates based on circulation from ReCAP’s facility.

## Meeting the Targets

The targets calculated by our model—a *minimum* of four to ten copies of each title preserved—place a high bar on shared print consortia. Currently most shared print programs seek to register a commitment to one last copy and permit individual members to make their own decisions whether or not additional copies are wanted to meet local demands. It is unlikely that individual shared print programs as currently configured will alone have the means or the administrative will to meet the standard for preservation of titles described here. This study emphasizes the need for shared print programs to further coordinate their efforts across multiple consortia in order to attain an appropriate number of commitments in a region, a country, or even worldwide.

## Current and Future Research

A vexing problem in long-term efforts is the need to evaluate progress within a meaningful planning horizon. The community cannot realistically commit to a fifty-year waiting period before assessing whether the shared print enterprise has succeeded or not. Further research on risk factors is important to this.

The assumptions and numerical data behind each probability factor included in our model must be questioned, reevaluated, and revised: better data entered into our tool can give more refined results more quickly than waiting fifty years. In this paper, we have proposed methods for determining the minimum viable retention levels based on various levels of overall risk, in order to achieve a given level of confidence that a viable copy remains available at some point in the future. At this system-wide level, we consider only a few broad factors: storage conditions, starting age of materials, and estimated risk of loss.

As mentioned earlier, we used data from the EAST study to estimate probability of usability (degradation) curves, where we defined usability in a conservative manner. As more information becomes available about how books degrade over time in various storage conditions—including the present-day condition of books that have been kept in environmental conditions that are not well documented (and possibly not well controlled)—the curves that describe probability of usability should be refined and minimum retention requirements recalculated. In the near term, print archives research should be attentive to the trends in the findings from these studies. A library collection is a large, heterogeneous gathering of papers that have been amassed and stored mostly in undocumented environmental conditions over hundreds of years. The technology to collect and analyze environmental data in useful form has been available only for a few decades. It is not realistic to expect a simple or universal answer to the question of how paper degrades. It is important to understand if the trends in research on this topic point towards overall better or worse outcomes compared to the current, limited data, especially where further research highlights subsets of materials for which there are signals for concern.

Other risks excluded from our model must also be revisited. For example, there is a notable risk from factors that cannot be anticipated or controlled, such as natural disaster or armed conflict, which have major and irreversible impacts on cooperative preservation efforts. To the degree that the library community can improve its knowledge of risk factors and develop controls, the outcomes of the shared print enterprise can be more predictable.

Some evaluation will be required after the first fifty-year milestone. In particular, the age to condition estimates need to be adjusted as items spend a greater percentage of their

time in good quality environments. The EAST data, and thus our usability curve, is based on data collected on materials that have been stored in the open stacks. Putting books into good quality environments reduces the rate of degradation for the period of time that they are in that environment. Once materials spend a significant portion of their lives in good quality environments, the degradation curve may need to be adjusted based on observed usability in the future. In the grand scheme, storage facilities are still new, and the impact of good quality environments is just beginning to adjust the usability estimates made here, but not enough to affect our generalizations. That will no longer be true after the first milestone. For example, a book that spends its first fifty years in the stacks and the next fifty in storage should appear closer to a 65-year-old book than a 100-year-old book. A book that is put into storage immediately may appear closer in condition to a book a quarter of its age that has spent its entire life in the stacks. No good quality storage facility has existed for fifty years yet, and many are younger than twenty years old.

The large impact of good quality environments also highlights the need in shared print management for a better way to determine what is in storage and what is in stacks. It is often unknown, copy by copy, which copies committed for shared print are in open library stacks and which are in storage facilities.

Shared print programs will also confront a fundamental not-enough-copies problem, the lack of sufficient copies of a work to meet preferences for risk from the outset. Solving the problem of what to do with titles that cannot reach the desired P1 will require strategies to mitigate or recover from information loss. Said another way, research on preservation strategies takes on a renewed importance in the shared print environment, so that we understand which methods and what resource levels are effective for addressing collections risk factors.

Gathering information on, or improving the forecasting of, risks can become an exercise with diminishing returns, however; libraries simply cannot fully predict or control future conditions. Consequently, development of meaningful interim targets and well-designed plans for validation of shared print archive holdings are important. Closely coupled to this is preservation science research that focuses on material properties of collection items in relation to their bibliographic identity, such as the Assessing the Physical Condition of the National Book Collection project coinvestigated by the Library of Congress and ReCAP (<https://nationalbookcollection.org/overview>). This effort connects the bibliographic focus of shared print to the material factors that determine preservation outcomes.

Finally, managers of libraries and shared print consortia need to review at the highest levels the costs and benefits of reducing risk. What is an acceptable level of loss? What will it cost to meet that threshold? Where libraries collectively hold ten or more copies of a title, will reducing the holdings still meet the current need for access? Where libraries hold fewer than ten copies of a title, what extra preservation measures, at what cost, are feasible to retain them? Ultimately this study is a tool in a broader range of decisions about the future of print collections.

## Conclusions

Our research was motivated by the desire of the research library community to gain a better understanding of the number of copies of a monograph that need to be retained in a shared print arrangement to ensure a high probability of long-term availability and usability. Relying on the literature and our own studies, we identified four factors as critical for the long-term survival of monographs: (1) on-shelf probability; (2) bibliographic inaccuracy; (3) physical

loss or irreparable damage; and (4) gradual physical deterioration, which depends on the initial condition and ongoing storage environment. We incorporated these factors into a flexible decision support tool to help managers of shared print consortia develop targets for the number of copies of a monograph title they would need to retain in order to have a high level of confidence that at least one usable copy will remain at the selected time horizon. The tool is flexible, allowing decision-makers to input their own estimates of various risk factors, informed by available data.

We utilized the tool to perform calculations for a range of age and time horizon combinations, from a new book with a desired retention time of fifty years to a 100-year-old book with a desired retention time of 200 years (see appendix A). The results show that 10 copies would satisfy the minimum requirement or more to reach a 99.8% chance of survival of one usable copy in all of the modeled situations, even if all copies were held in open library stacks. Fewer copies may be needed if the selected time horizon is shortened, if the book is newer, or if at least some copies are stored in environmentally controlled storage rather than in open library stack conditions.

This research highlighted especially the large impact that closed-stack, environmentally controlled storage can have on the preservation of books. These conditions reduce the level of risk for our first three factors to a statistically insignificant level, and they reduce the rate of deterioration to a quarter of that for storage in typical open library stacks.

It was especially challenging to find reliable data characterizing the magnitude of each risk factor. Further research is needed both to test and verify the data used and to adjust the data as the implications of changes in the manufacture, storage, and use of monographs become evident.

Finally, and most importantly, this tool is only one facet of a much larger decision-making process confronting managers of libraries and shared print consortia. The model can calculate probabilities of survival, but managers must decide and agree on time horizons, tolerance for risks, and the cost/benefit trade-off of measures to retain titles into the future.

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## Appendix A

The following table shows results from running the spreadsheet tool using the parameters described in this paper:

- Without item-by-item verification, the probability the copy can actually be located at the time of analysis is 97%
- Without item-by-item verification, the probability that bibliographic inaccuracy will result in selecting a copy for retention that is not the intended item is 0.1%
- The annual loss rate over the period if the copy is kept in stacks is 0.01% and 0.00% if kept in storage
- Deterioration over time progresses along a curve relative to the age of the copy according to the appropriate curve shown in Figure 7
- Deterioration is only 25% as large if the copy is kept in storage assuming that it is at about 20°F cooler than open library stacks

Within each time horizon, calculations are made for books that at the time of analysis are new, 50 years old, and 100 years old. Pink indicates that the probability ( $P_1$ ) of at least one usable copy remaining at the end of the designated time horizon ( $T$ ) falls below 99.8%; blue that the probability exceeds 99.8%.

50 Year Horizon										
New Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	82.77431%	97.03276%	99.48887%	99.91195%	99.98483%	99.99739%	99.99955%	99.99992%	99.99999%	100.00000%
Storage	97.30909%	99.92759%	99.99805%	99.99995%	100.00000%	100.00000%	100.00000%	100.00000%	100.00000%	100.00000%
50-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	60.53314%	84.42367%	93.85251%	97.57378%	99.04245%	99.62208%	99.85085%	99.94113%	99.97677%	99.99083%
Storage	77.41734%	94.90023%	98.84834%	99.73992%	99.94127%	99.98674%	99.99700%	99.99932%	99.99985%	99.99997%
100-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	49.47022%	74.46742%	87.09844%	93.48087%	96.70590%	98.33550%	99.15893%	99.57501%	99.78525%	99.89149%
Storage	60.30455%	84.24271%	93.74507%	97.51708%	99.01439%	99.60876%	99.84470%	99.93835%	99.97553%	99.99029%
100 Year Horizon										
New Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	60.23121%	84.18443%	93.71034%	97.49868%	99.00525%	99.60440%	99.84268%	99.93743%	99.97512%	99.99010%
Storage	94.37419%	99.68350%	99.98219%	99.99900%	99.99994%	100.00000%	100.00000%	100.00000%	100.00000%	100.00000%
50-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	49.22348%	74.21745%	86.90852%	93.35260%	96.62468%	98.28613%	99.12976%	99.55812%	99.77563%	99.88607%
Storage	72.85088%	92.62925%	97.99891%	99.45672%	99.85250%	99.95996%	99.98913%	99.99705%	99.99920%	99.99978%

## A Model to Determine Optimal Numbers of Monograph Copies 799

100-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.96938%	72.92814%	85.91434%	92.67114%	96.18675%	98.01594%	98.96768%	99.46288%	99.72053%	99.85459%
Storage	57.87940%	82.25855%	92.52720%	96.85241%	98.67422%	99.44157%	99.76479%	99.90093%	99.95827%	99.98242%

### 150 Year Horizon

New Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	48.97796%	73.96752%	86.71770%	93.22310%	96.54229%	98.23580%	99.09987%	99.54074%	99.76567%	99.88044%
Storage	91.01814%	99.19326%	99.92754%	99.99349%	99.99942%	99.99995%	100.00000%	100.00000%	100.00000%	100.00000%
50-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.73012%	72.67859%	85.71913%	92.53541%	96.09827%	97.96057%	98.93399%	99.44280%	99.70875%	99.84776%
Storage	67.86361%	89.67252%	96.68112%	98.93343%	99.65724%	99.88985%	99.96460%	99.98862%	99.99634%	99.99883%
100-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.73012%	72.67859%	85.71913%	92.53541%	96.09827%	97.96057%	98.93399%	99.44280%	99.70875%	99.84776%
Storage	55.30155%	80.02049%	91.06947%	96.00819%	98.21572%	99.20246%	99.64351%	99.84065%	99.92878%	99.96816%

### 200 Year Horizon

New Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.49205%	72.42915%	85.52311%	92.39848%	96.00860%	97.90420%	98.89954%	99.42217%	99.69659%	99.84069%
Storage	85.84795%	97.99719%	99.71656%	99.95989%	99.99432%	99.99920%	99.99989%	99.99998%	100.00000%	100.00000%
50-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.49205%	72.42915%	85.52311%	92.39848%	96.00860%	97.90420%	98.89954%	99.42217%	99.69659%	99.84069%
Storage	62.78090%	86.14739%	94.84418%	98.08105%	99.28578%	99.73418%	99.90106%	99.96318%	99.98629%	99.99490%
100-Year-Old Books										
	1 Copies	2 Copies	3 Copies	4 Copies	5 Copies	6 Copies	7 Copies	8 Copies	9 Copies	10 Copies
Stacks	47.49205%	72.42915%	85.52311%	92.39848%	96.00860%	97.90420%	98.89954%	99.42217%	99.69659%	99.84069%
Storage	51.30719%	76.29010%	88.45498%	94.37841%	97.26269%	98.66713%	99.35099%	99.68398%	99.84612%	99.92507%

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## Notes

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# Training Information Professionals in the Digital Humanities: An Analysis of DH Courses in LIS Education

Chris Alen Sula and Claudia Berger

The digital humanities (DH) remain a growing area of interest among researchers and a locus of new positions within libraries, especially academic libraries, as well as archives, museums, and cultural heritage organizations. In response to this demand, many programs that train information professionals have developed specific curricula around DH. This paper analyzes courses offered within two overlapping contexts: American Library Association (ALA) accredited programs and iSchools. In addition to documenting the scope and extent of DH courses in these settings, we also analyze their contents, relating our findings to previous research, including analysis of job ads and interviews with professionals.

## Introduction

The digital humanities (DH) are a cluster of scholarly activities that explore the intersections of humanities and technology. While the boundaries of the field are disputed,<sup>1</sup> there is wide agreement that DH is interdisciplinary,<sup>2</sup> collaborative,<sup>3</sup> and often critical in its approach to tools and technology.<sup>4</sup> Many have also recognized overlaps between DH and libraries, archives, museums, and other cultural heritage institutions,<sup>5</sup> as well as the library and information science (LIS) education that prepares knowledge workers for careers in these settings.<sup>6</sup>

In 2014, the Research Planning and Review Committee of the Association of College & Research Libraries (ACRL) named digital humanities as one of the top trends in academic libraries, identified as “logical partners for digital humanities collaborations because they have already developed the skill sets necessary to sustain and preserve a digital archive.”<sup>7</sup> Since 2010, ACRL’s biennial trends reports have mentioned DH or DH-adjacent areas, such as digital collections and preservation, data curation and analysis, digital scholarship, new publishing models, project management, and programming.<sup>8</sup> As recently as 2021, an analysis of LIS job listings found frequent mention of DH in academic library positions, especially in reference to faculty and student research, and in positions within archives, museums, and cultural heritage institutions, given their extensive work with digitizing and digitized materials.<sup>9</sup> Among the sample job duties and skills for these positions were “partner[ing] with faculty, students, and

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other researchers to create effective, innovative, and sustainable digital scholarship projects" and having "hands-on experience in an academic/research setting in one or more of following areas in digital scholarship: data science; text mining, analysis; data mining, visualization; natural language processing, human computer interaction, GIS applications and tools."

Given the current and projected prevalence of DH and related expertise in LIS settings, it is worth considering what educational opportunities exist for professionals in the field. Training in DH takes place across many contexts, from university courses and programs to informal settings such as workshops, (un)conferences, institutes, and more. Formal educational offerings provide unique opportunities for studying a field, particularly because they carry accreditation standards, organize labor and capital, and present public-facing views of the field to prospective students, employers, funders, and the public. Studies of formal education can also guide others who wish to add curricular offerings at their own institutions, helping to build capacity within the field.

Because DH is a relatively recent development,<sup>10</sup> it has taken time for LIS programs to add offerings in the area. In 2017, a series of interviews with librarians working in or adjacent to DH found that 90 percent learned relevant skills on the job, while only 29 percent learned such skills during their time in library school.<sup>11</sup> Moreover, 30 percent of respondents said that the concept of DH did not exist when they were in library school. More recent surveys of DH instructors also suggest they are largely autodidacts, but when they do have formal encounters learning DH, those are more often found in graduate programs,<sup>12</sup> consistent with the level at which many information professionals are trained.

Here, we focus on DH courses offered within the context of LIS programs, as defined by two overlapping contexts: American Library Association (ALA) accredited programs and iSchools, an international group of institutions focusing on the information field. Both of these settings train professionals for work at institutions that have been identified as key sites of DH work and as partners for collaboration. In surveying these courses, this study addresses several questions, including:

- What skills and competencies do LIS programs provide students and employers?
- Where do LIS and DH overlap conceptually and methodologically?
- How does LIS-inflected DH align with and diverge from the broader field?

In pursuing these questions, we pay particular attention to disciplinarity, employment, and technology, as well as how our results align with or diverge from previous research and discussions about DH. The findings of this study should help readers keep pace with recent developments, contribute to studies of educational infrastructure, and suggest possible paths for the field.

This research was conducted through the iSchools Digital Humanities Curriculum Committee (iDHCC), convened in 2019 in parallel to a Data Science Curriculum Committee (iDSCC), to report on opportunities and possible models for DH curricula in iSchools. The iDHCC studied programs, courses, job listings, and other data sources<sup>13</sup>—all of which have informed and contextualized the analysis of courses presented here.

## Background

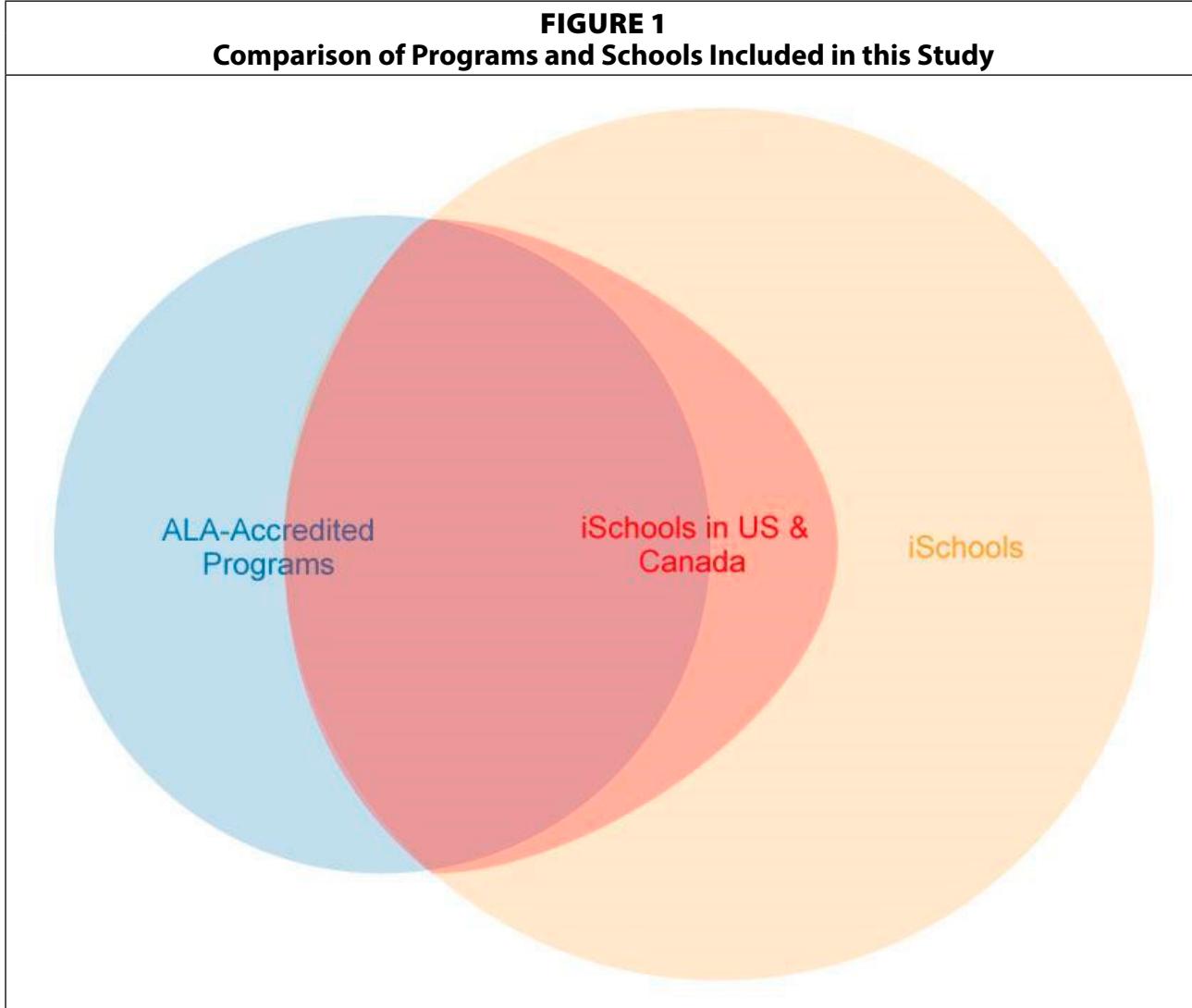
Existing studies of DH curricula at large have surveyed programs,<sup>14</sup> course syllabi,<sup>15</sup> instructors,<sup>16</sup> and practitioners.<sup>17</sup> Numerous articles have discussed the development of DH programs and courses in specific locations, such as community colleges,<sup>18</sup> colleges of liberal arts and sciences,<sup>19</sup>

graduate education,<sup>20</sup> and libraries.<sup>21</sup> While several of these studies have addressed how librarians learn and teach DH, none has systematically examined DH courses across LIS education as a whole.

This study draws on Lisa Spiro's methodology, which examines course assignments, readings, media types, key concepts, and technologies in an attempt to characterize the "hidden curriculum" found throughout DH courses.<sup>22</sup> That study included 134 English-language syllabi from DH courses offered between 2006 and 2011 across a range of departments, and it established a baseline for understanding DH courses one decade ago. Here, we focus on a smaller set of courses and syllabi situated more recently within LIS education, defined broadly by two groups: ALA-accredited programs and iSchools.

As of 2020, the ALA listed sixty-two programs in the United States and Canada that have undergone external review and meet the ALA Committee on Accreditation's Standards for Accreditation of Master's Programs in Library and Information Studies. The iSchools organization, founded in 2005, included 109 schools, colleges, and departments worldwide that share a fundamental interest in the relationships between information, people, and technology. Though there are overlaps between these two groups—about 80 percent of iSchools in the US have ALA-accredited programs (see figure 1)—there are also important differences, given their histories, conceptual scope, and geographic locations.

**FIGURE 1**  
**Comparison of Programs and Schools Included in this Study**



Several articles and panels have explored the intellectual identity of iSchools,<sup>23</sup> as well as their relationship to similar schools outside of the iCaucus, including ALA-accredited programs.<sup>24</sup> As a whole, iSchools are said to share overlapping interests around “contextual analysis of information use in the lives of people, organizations, and cultures.”<sup>25</sup> One example is a recent paper from iDSCC members that defines the unique disposition of data science within iSchools as “developing insights and solutions that are not only data-driven, but also incorporate human values, including transparency, privacy, ethics, fairness, and equity”<sup>26</sup>—values that are undoubtedly shared among humanists, including digital humanists. Beyond common interests and shared values, an analysis of their faculty diversity has found “evidence of the influence of ‘local logics’ on their development. That is, the form and shape of an iSchool has more to do with responding to the local environment than with any defining characteristic or shared intellectual identity across iSchools.”<sup>27</sup> In this respect, the heterogeneity of iSchools parallels Kim Knight’s description of DH as a “messy...ecology” comprising “the localized practices of [DH] practitioners,” which vary among humanities computing, new media studies, digital pedagogy, and more.<sup>28</sup>

In contrast with iSchools, ALA-accredited programs share formal core competencies, “basic knowledge to be possessed by all persons graduating from an ALA-accredited master’s program in library and information studies.”<sup>29</sup> Among the competencies most germane to DH are those concerning information resources (especially digital resources), knowledge organization (especially cataloging and classification of DH materials), technological knowledge and skills (including the analytical, visualization, and content management tools used by digital humanists), and user services. In Table 1, we present a mapping of ALA competencies onto parent activity terms in the Taxonomy of Digital Research Activities in the Humanities (TaDiRAH),<sup>30</sup> which attempts to capture the “scholarly primitives” of the field.<sup>31</sup> This table provides a conceptual and practical alignment of the two fields, useful both in analysis of and planning for DH curricula within LIS contexts, which we discuss below.

All eight areas of the DH taxonomy are covered somewhere in the ALA competencies, especially “Storage” (including archiving, knowledge organization, and preservation) and “Meta-Activities,” which combine research activities with a research object (examples include assessment, community building, and teaching and learning). The prevalence of “Storage,” in particular, contrasts with previous studies of DH curricula, which have failed to find widespread mention of these activities within North American DH programs.<sup>32</sup> It is worth noting, however, that conceptual fit between areas and the language used to describe curricula may diverge—the latter being one way programs to attract students and the former being an abstract view of the fields as held by experts.

We approach our analysis here in terms of what is distinctive about DH in the context of LIS education and particular institutions, as well as what is shared between LIS and other disciplinary contexts of DH. Put differently, we attend to both localization of DH and more global constructions of the field. While the data on ALA schools is limited to the United States and Canada, the iSchools are international in scope, providing some perspective on DH courses worldwide. As Roopika Risam and others have noted, discussions of DH often center on North American or, at best, Anglo-American approaches, when in fact all DH practices are local and we should embrace “the dialectical relationship between global and local that manifests in our work to understand the hallmarks of the local—our accents—present in DH scholarship.”<sup>33</sup>

**TABLE 1**  
**ALA Core Competencies Related to Digital Humanities**

## Methods

We began data collection in Spring 2020 by consulting the Directory of ALA-Accredited and Candidate Programs in Library and Information Studies (<http://www.ala.org/educationcareers/accreditedprograms/directory>) and the iSchool Directory (<https://www.ischools.org/members>) and manually inspecting all program/school entries for graduate-level DH courses. We inspected both institutional course catalogs and program/school webpages, including lists of special topics courses.

We included only those courses explicitly aligned with DH—either by naming DH in the title or by extensively referencing the field in the course description—rather than a broad array of courses that could be related to the field (e.g., digital libraries, data management, academic librarianship, and scholarly communications). Explicit mention of DH in a course title or course description is important in several respects: it signals an intent to link the course directly to the field and to prepare students for work in relevant positions. It also invokes meta-level or reflective considerations about the field, which some commentators have noted as critical in defining DH.<sup>34</sup> Similarly, our list does not include traditional subject librarian courses (e.g., humanities services and sources, art librarianship, or academic librarianship more broadly), which might include mention of DH as an emerging trend but not sustained focus on it. Finally, it should be noted that several institutions allow students to take courses outside of an ALA program or iSchool, and courses in these other disciplines were not included here, though they may merit further study.

A total of thirty-nine courses were identified across thirty-one institutions, and syllabi or extended course descriptions were obtained for twenty-seven courses, 69 percent of all courses identified (see appendix A for a list of institutions included in this study). About half of these syllabi (38 percent of all courses identified) were available online through department websites or through web searches; the rest were provided on request from instructors or departments. There were various reasons why the remaining syllabi could not be obtained: some courses were part of new programs and had not yet been offered, some were offered by adjunct faculty no longer teaching at that institution, and in a few cases we simply did not receive the syllabus after making several requests. Still, our success in obtaining syllabi likely reflects the values of “openness” and “collegiality and connectedness” that are said to mark DH as a field.<sup>35</sup>

Inspired by Spiro’s study, we focus here on course titles, course descriptions, syllabus topics, learning outcomes, sources cited, and technologies. Through a combination of frequency analysis and text analysis, we explore the general DH content found in these courses, as well as LIS-specific topics, terms, and sources. In some cases, the syllabus text was preprocessed (e.g., “**digital humanities**” was converted to “**digital\_humanities**” to preserve its meaning), or categories were created to group various examples (e.g., technologies), but for the most part we follow the actual language used by instructors in their syllabi.

Using syllabi as a data source necessarily brings certain limitations: we can only study what is actually written down on a syllabus. Most syllabi list readings, but some provide little or no detail on assignments, resources, and activities that occur during a class. Syllabi may be more general or more specific in the concepts and terms that they use, independent of how these are covered within the class itself. That said, other factors make syllabi a quality source of data: contemporary syllabi almost always include learning outcomes as a matter of accreditation standards, special terminology within an academic field is often more standardized

**TABLE 2**  
**Summary of Programs, Schools, and Courses Included in This Study**

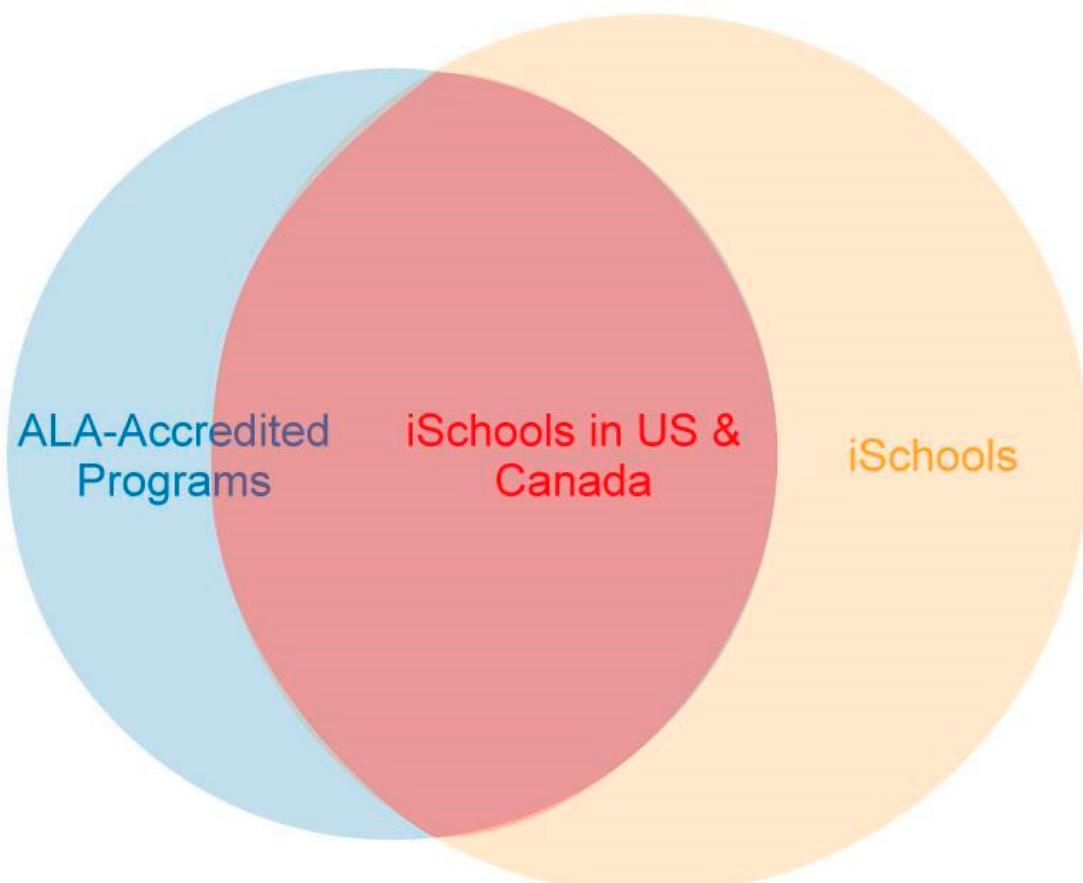
	Total Programs/ Schools Listed N	Programs/Schools Offering DH Courses N (%)
ALA-accredited programs	62	20 (32.3%)
ALA-accredited programs within iSchools	36	15 (41.7%)
iSchools within the US & Canada	48	15 (31.3%)
All iSchools	109	26 (23.9%)

than everyday discourse, and citations provide clear references to scholars and their work. These and other features suggest that syllabi can reveal a great deal about curriculum, though hidden aspects may remain.

## Results and Discussion

Below, we present our findings on the presence of DH courses in LIS contexts, as well as analysis of their content. Because some course descriptions and syllabi could not be obtained and because some syllabi do not address every aspect of our analysis, the total number of items in each analysis (N) varies, depending on what is being analyzed (courses, institutions,

**FIGURE 2**  
**Comparison of Programs and Schools with Digital Humanities Courses**



syllabi that mention specific technologies, etc.). Percentages are reported relative to the total number of items in each analysis.

### *Course Offerings*

Around one-quarter of iSchools and one-third of ALA-accredited programs offer DH courses (see table 2). Again, many more schools/programs offer DH-adjacent courses, which fall outside the scope of our analysis here. Most notable is the intersection between the two groups in our study: all iSchools in the US and Canada that offer DH courses do so in the context of an ALA-accredited program (see figure 2). These fifteen institutions comprise the majority of our data here, contributing around half of all course descriptions and nearly 60 percent of syllabi to this study. Thus, this group may be considered the core of our data and the picture of DH within LIS that we present here.

While these numbers may seem relatively low, it is worth noting that DH is a specialization within LIS education and certainly not as central or ubiquitous as archives,<sup>36</sup> knowledge organization,<sup>37</sup> or even data science.<sup>38</sup> Not all LIS graduates become academic librarians specializing in the humanities, and not all information professionals work with(in) DH. Still, there appears to be potential for growth in DH courses offered within LIS education.

In schools/programs with two or more DH courses, the first one is routinely an introduction to theory and methods, and the second course (and sometimes following ones) covers projects or specialized methods and technologies such as text encoding, text mining, or data science (see table 3). Most of these courses contain the term “digital humanities,” consistent with our selection criteria. “Information” and “introduction” are next most frequent, each appearing fewer than ten times in the thirty-nine course titles.

**TABLE 3**  
**Selected Titles of Digital Humanities courses Offered in LIS Environments**

Introductory Course Titles	Advanced Course Titles
Digital Humanities	Advanced Projects in Digital Humanities
Introduction to Digital Humanities	Data Science in the Humanities
Survey of Digital Humanities	Technologies and Tools of Digital Humanities
Humanities Information	Programming for Digital Humanities
History and Theory of Digital Humanities	Digital Humanities Capstone
Digital Humanities Librarianship	Digital Humanities Practicum

Not included here are DH-related courses offered outside of ALA-accredited programs and iSchools (i.e., in other departments) that LIS students are allowed to take as part of their formal programs. In our search of program/school curricula, many of these courses were offered in computer science and various humanities departments, consistent with recent research that shows DH as a bridge between other disciplines—notably, computational linguistics and information science on the one hand, and humanistic disciplines on the other.<sup>39</sup> Because other departments and disciplines may already offer relevant, DH-related courses, they offer promising opportunities for engagement with LIS education, a suggestion we return to in our conclusion.

### *Course Descriptions and Key Concepts*

We next turned to the course descriptions and what we called the “key concepts” found in

each syllabus. Course descriptions were drawn from course catalogs, or what appeared at the beginning of a syllabus. As such, we were able to include courses (N=38) even when their syllabi were missing. “Key concepts” were drawn directly from syllabi, including headings for each week or for units of a course, and any descriptions of what content was covered in them. As with the course titles, we normalized some data (as described in “Methods” above) and calculated word frequencies using Voyant, an open-source, web-based tool frequently used for text analysis by digital humanists.

Course descriptions and keywords shared about half of their most frequent terms in common, including “digital\_humanities,” “data,” “humanities,” “digital,” and “information” (see table 4). However, the other top terms in the course descriptions were broader in nature (“course,” “research,” “students,” “methods,” and “tools”), whereas the key concepts focused more on the course activities and topics (“analysis,” “introduction,” “text,” “application,” and “network”).

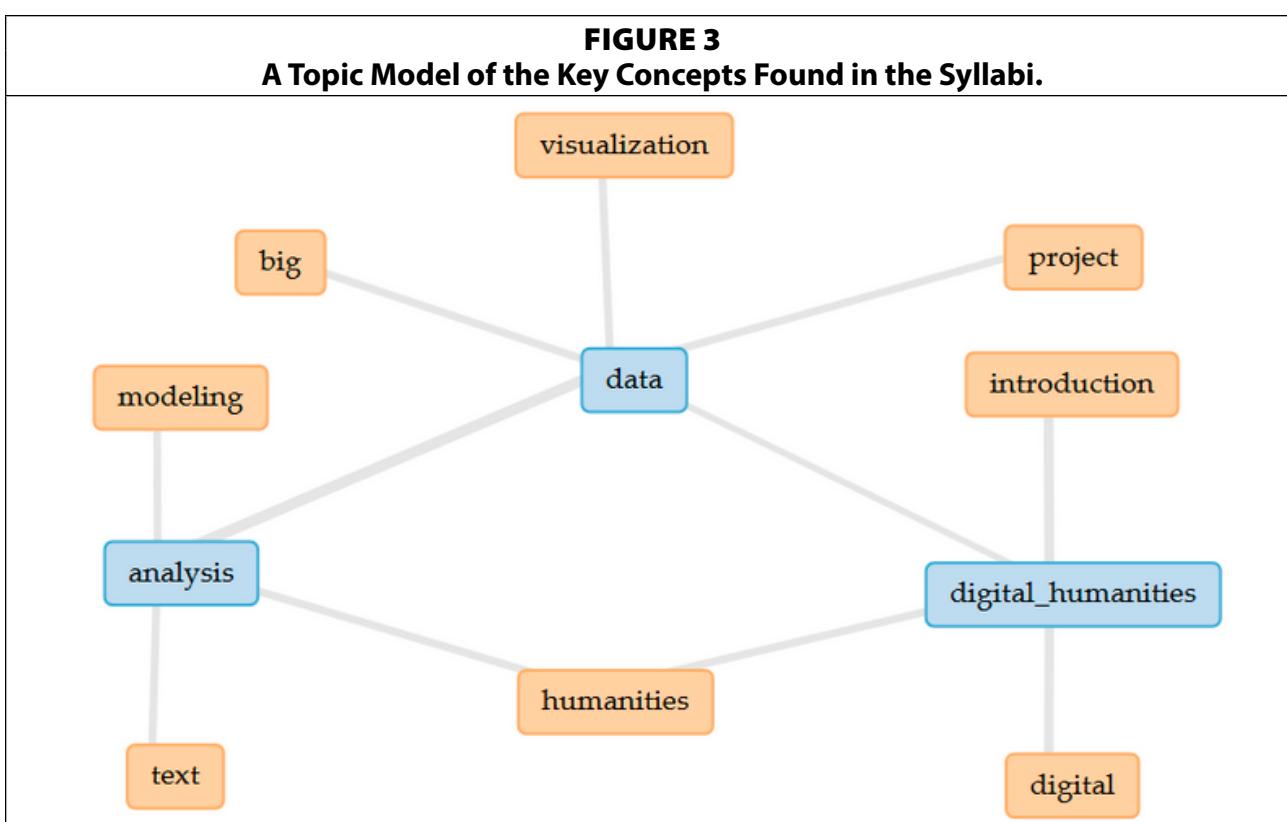
**TABLE 4**  
**Most Frequent Terms in Course Descriptions and Key Concepts Found in Syllabi. Italics Indicate Terms Common to Both Lists**

Rank	Course Description Terms	Frequency (N)	Key Concepts Terms	Frequency (N)
1	<i>humanities</i>	55	<i>digital_humanities</i>	44
2	<i>digital_humanities</i>	54	<i>data</i>	43
3	<i>course</i>	53	<i>analysis</i>	32
4	<i>digital</i>	47	<i>humanities</i>	29
5	<i>research</i>	40	<i>introduction</i>	29
6	<i>students</i>	31	<i>digital</i>	26
7	<i>methods</i>	30	<i>text</i>	26
8	<i>data</i>	28	<i>information</i>	12
9	<i>tools</i>	24	<i>network</i>	11
10	<i>information</i>	19	<i>project</i>	11

We analyzed key concepts further using the “links” tool in Voyant to create a topic model visualization based on the co-occurrences of the terms. The top three terms, “digital\_humanities,” “data,” and “analysis,” were the anchors of this model, with the remaining top terms branching off from them (figure 3). This visualization surfaced key themes from courses, including data work (“big data,” “data visualization,” “data projects”), text analysis, and introductions to the digital humanities.

This picture resembles Tanya E. Clement and Daniel Carter’s analysis of DH course categories across departments, which found that history and theory are most common, with techniques and methods as third.<sup>40</sup> Their second most common category was information systems and collections, which does not appear in our corpus. Also absent here are LIS-specific topics one might expect to see in a digital humanities course at an iSchool or ALA-accredited program, such as preservation, data management, metadata, or access/discovery—all of which are important issues in digital humanities where information professionals can contribute unique expertise.<sup>41</sup> Such concepts are presumably covered in other areas of LIS coursework besides specialized courses on DH. It remains unclear whether and how students bring these lenses to their coursework in digital humanities.

**FIGURE 3**  
A Topic Model of the Key Concepts Found in the Syllabi.



### *Learning Outcomes*

Nearly all syllabi (twenty-five of twenty-seven) contained learning outcomes: explicit statements of concepts and skills that students acquire in each course. We extracted these outcomes, removed preface material (e.g., “In this course, students will...”), and split compound outcomes into their separate parts (e.g., “discuss and evaluate X” became “discuss X” and “evaluate X”). We then removed common stopwords in Voyant (“the,” “of,” “and,” “before,” etc.) and visualized results using the Word Tree tool (figure 4), which sizes terms based on their frequency and arranges them in a suffix tree, helping to identify recurrences (e.g., “critically evaluate” or “analyze implications”).<sup>42</sup>

Because learning outcomes are typically written in a similar syntax, this tree offers a common vocabulary of learning activities, as well as detail about the content of each. For example, foundational concepts are reflected in verbs such as “understand,” “describe,” and “articulate,” while generative activities may be marked by “create” or “develop.” There is frequent emphasis on critical evaluation and review, applying (things) appropriately, and analyzing implications—again, critical discussions being a hallmark of DH and the humanities more broadly. “Evaluate” also appears lower in the frequencies as a verb, especially in connection to DH projects.

These trends mirror Yin Zhang, Fangli Su, and Brenna Hubschman’s analysis of DH jobs posted to the ALA JobLIST between 2006 and 2018.<sup>43</sup> Their study found that “project” skills (analogous to “apply,” “develop,” and “create” in our analysis) and “communication” skills (analogous to “describe,” “articulate,” and “discuss” in our analysis) were the most common required skills, present in 64 percent of ads. Moreover, 51 percent of ads mentioned being responsible for the implementation, evaluation, promotion, and integration of emerging and existing tools. “Project” was among the top ten key concepts in the syllabi we examined, and

**FIGURE 4**  
**Word Tree Visualization of Learning Outcomes in Digital Humanities Courses**



both project management and communications skills appear frequently in student learning outcomes. Indeed, it would appear that DH courses within LIS anticipate needs in these areas among employers, and respond to them.

## *Technologies*

Over half of the syllabi we obtained (55%) mention specific technologies that are covered in each course. We extracted these mentions, normalized them (by correcting spelling errors and combining variants such as “Oxygen” and “Oxygen XML Editor”), and categorized each technology into one of several broad areas (see table 5). Many syllabi mention technologies for text enrichment and text analysis—text encoding initiative (TEI) being the most frequent, which Susan Hockey highlights “above all others” as a significant advancement in and from the field.<sup>44</sup> Also frequent are technologies related to data, general programming languages, visualization tools, mapping software, and platforms for archives and collections—the last category despite the lack of storage-based topics we saw in earlier analyses.

**TABLE 5**  
**Technologies Mentioned in Digital Humanities Syllabi**

Technology Areas	Examples of Specific Technologies	Frequency
Text	TEI, Voyant, AntConc, Mallet	23
Data	R, OpenRefine, Excel	15
Programming	Python, Jupyter Notebooks, HTML	11
Visualization	TimelineJS, Tableau	10
Mapping	StoryMaps, QGIS, Carto	10
Archives & Collections	Omeka, Scalar, Manifold	10
Other	sensors, games, 3D printing	7
Media	Audacity	3
Networks	Gephi	2

Returning to Zhang, Su, and Hubschman’s analysis of DH job ads, data visualization (in 23% of ads), text mining (22%), and languages (20%)—both programming and non-English spoken languages—were all frequently mentioned, as well as technologies and standards such as XML, TEI, MODS, METS, and GIS (17%).<sup>45</sup> Though there are some differences in the relative frequencies of various technology areas between our study and theirs, there is generally wide agreement between the specific technologies covered within DH courses in our study and the technologies mentioned in job ads.

Looking finally at the breadth of technologies covered, each syllabus that mentioned technology did so in at least two areas, usually three or more. While some areas were found together more often (e.g., data and text-related technologies), most syllabi include a wide range of technologies across different areas, suggesting that DH information professionals are trained to be generalists, familiar with many different technologies and their accompanying methods. To some extent, this may differ from non-LIS-based DHers, who may focus on particular methods and tools associated with their topical interests. DH librarians have been described as “specialized generalists,”<sup>46</sup> knowledgeable about a wide range of technologies without necessarily having deep experience with them: “It’s not necessary that we know all the technical aspects of these technologies, but we should be able to connect professors with these technical resources.”<sup>47</sup> That said, many DH librarians do have specialization in particular areas based on their elective coursework, research, or previous degrees—and particular technological foci may travel with them, or develop over the course of work at a particular institution, given faculty and student interests.

### Sources

Most syllabi (twenty-three of twenty-seven) included references, totaling 860 citations, one-quarter of which were marked as optional readings. We include these optional readings in our analysis below to paint the most inclusive picture of the sources assigned in courses. Generally speaking, these syllabi fall into one of two broad groups: those that assign a wide range of articles and websites (often forty or more sources across the semester) and those that assign one or more books, especially textbooks (more often found in technology-heavy courses, such as Text Mining).

Each citation was examined to determine the authors(s) and source title. Around 20 percent of all citations are to tutorials, webpages, Wikipedia, and other entries for which no author is named in the syllabus. Over 500 names appear across the syllabi, though all but the most frequent (table 6) have only a few mentions. For comparison, we include the number of times each source appears in the Open Syllabus (<https://opensyllabus.org>) corpus, a database of more than seven million college course syllabi.

**TABLE 6**  
**Most Frequent Authors and Sources Assigned.** (Full references are provided in Appendix B)

Authors	Sources	Frequency in Syllabi in this Study (N)	Frequency in Open Syllabus Corpus (N)
Gold, M. K. (Ed.) Gold, M. K., & Klein, L. F. (Eds.)	<i>Debates in Digital Humanities</i> (2012) <i>Debates in the Digital Humanities</i> (2016)	16 6	350 2
Posner, M.	"No Half Measures: Overcoming Common Challenges to Doing Digital Humanities in the Library" (2012) "How Did They Make That?" (2013) "What's Next: The Radical, Unrealized Potential of Digital Humanities" (2015)	5 5 5	12 – –
Schreibman, S.,	<i>Companion to Digital Humanities</i> (2004)	9	321
Siemens, R. & Unsworth, J. (Eds.)	<i>A New Companion to Digital Humanities</i> , 2nd edition (2016)	5	82
Muñoz, T. Muñoz, T. & Rawson, K. Muñoz, T. et al.	"Digital Humanities in the Library Isn't a Service" (2012) "Against Cleaning" (2016) (various other publications)	4 3 4	– 19 –
Underwood, T.	"Topic Modeling Made Just Simple Enough" (2012) (various other publications)	4 6	– –
Burdick, A., Drucker, J., Lunenfeld, P., Presner, T. & Schnapp, J.	<i>Digital_Humanities</i> (2012)	8	90
Nowviskie, B.	"Skunks in the Library: A Path to Production for Scholarly R&D" (2013) (various other publications)	5 3	8 –

**TABLE 6**  
**Most Frequent Authors and Sources Assigned.** (Full references are provided in Appendix B)

Authors	Sources	Frequency in Syllabi in this Study (N)	Frequency in Open Syllabus Corpus (N)
Kirschenbaum, M.	<p>"What Is Digital Humanities, and What's It Doing in English Departments?" (2010)</p> <p>"What Is 'Digital Humanities,' and Why Are They Saying Such Terrible Things about It?" (2014)</p> <p><i>Mechanisms</i> (2007)</p> <p>"Digital Scholarship and Digital Studies: The State of the Discipline" (2014)</p>	3 2 2 1	131 10 185 11
Risam, R.	<p>"Beyond the Margins: Intersectionality and the Digital Humanities" (2015)</p> <p>(various other publications)</p>	2 6	– –
Sula, C. A.	<p>"Digital Humanities and Libraries: A Conceptual Model" (2013)</p>	4	16
Weingart, S. B.	<p>"Demystifying Networks" (2011)</p>	4	–

The top sources assigned include several collected volumes and textbooks that are staples found in DH courses across various contexts, including the *Debates in the Digital Humanities* series and the two versions of *Companion to Digital Humanities*. More unique to this list are the number of sources specific to DH in libraries, which are less frequently found outside of LIS contexts.

The most cited single author in these syllabi is Miriam Poser, whose works here span project design, DH in academic libraries, and humanistic reflections on datasets. Her "How Did They Make That?" series, which reverses engineers well-known digital projects to introduce students to new tools and technologies, is widely recognized in the field,<sup>48</sup> as are her very practical reflections on doing DH in academic libraries, ranging from issues of training and infrastructure to authority and institutional commitment. Also prominent is Trevor Muñoz's work with collaborators on data curation and DH librarianship, especially with reference to access and sustainability.<sup>49</sup> These authors and their views (among others) give us a sense of what LIS contributes uniquely to DH—what parts of DH come by and from LIS as a field.

To highlight only one critical contribution that LIS has made to DH, we might look at the debate around librarians and the notion of service in DH. In part, the idea of service arises from an antiquated view of librarianship as handmaiden to the other disciplines, producing only secondary or derivative scholarship, as opposed to its own objects of inquiry.<sup>50</sup> Many commentators, including Posner,<sup>51</sup> have challenged this notion, instead positioning librarians as coresearchers and cocreators in the field. Service becomes collaboration; library labor shifts from instrumental to integral and essential in projects. Brett D. Currier, Rafia Mirza, and Jeff Downing link this development to new positions in the field: "As positions in scholarly communication, digital humanities, data, and e-science have increased, there has been a shift from librarians as content and knowledge curators to knowledge and content creators."<sup>52</sup> These

interlocutors and others have added much to the literature on collaboration, collegiality, and values in DH<sup>53</sup> through their specific discussion of libraries and librarians.

## Conclusions

Key findings of this study include the following:

- While DH is reflected in LIS course offerings, there remains potential for growth in many institutions. Most programs/schools lack a DH course, and many others offer only a single introduction to the field—though DH-adjacent offerings may be more prevalent.
- Where DH courses are offered, there is significant overlap between iSchools and ALA-accredited programs, suggesting that libraries and librarians are especially relevant to DH among information professionals.
- The terms and concepts, learning outcomes, and technologies covered in these courses reflect other representations of DH, including studies that analyze LIS job ads and interviews with information professionals. It also appears that formal training, where available, indeed reflects work in the field.
- Though DH courses both inside and outside of LIS share many readings in common, a distinctive set of readings focused on libraries and librarians appears frequently within LIS-based courses. This subset raises important issues about data curation, project management, and labor in the academy—important not only for information professionals but also for DH as a whole.

As we have noted above, these results are presented with several cautions, including general limitations of syllabus studies and restrictions imposed by our selection criteria for courses. To supplement these findings, we have referenced other studies<sup>54</sup> that rely on alternative data sources, including job ads and interviews with practitioners, and critical debates in the field. Several points of agreement between these studies and ours suggest that our corpus of DH syllabi indeed reflects the needs and experiences of working in the profession. Still, we have some reservations about our conclusions, particularly with respect to a more global and inclusive picture of the field.

Of the twenty-seven syllabi we collected, twenty-two (81%) are from institutions located in either the United States, the United Kingdom, or Canada, locations that represent 74 percent of all courses we identified. There were no courses, let alone syllabi, identified from institutions in South America, Africa, or Southeast Asia, even though these regions clearly are sites of DH. Even among the courses we did study, there was not enough data to make interesting distinctions between the US/UK/Canada and other areas in Europe, the Middle East, and China. For this reason, we must acknowledge that our results reflect a largely Anglophone picture of DH courses within LIS education. This is a well-established critique of DH<sup>55</sup> and of scholarship more generally.<sup>56</sup> Whether it is a special problem within LIS education is yet unclear and remains a question for future research. Such work will be aided by continued outreach to and awareness of DH efforts across the globe.

In parallel with global efforts, we also note the potentials for local outreach within one's own institution and region. Where DH courses do not exist in LIS curricula, it may be possible to cross-list courses offered elsewhere or include such courses in elective options for students. Where DH courses do exist in LIS curricula, their success may depend on integration with other degrees, departments, and consortia.

A particularly telling example may be the longstanding success of the University of Alberta, which offers several DH courses within its ALA-accredited program. These courses are

also part of an interfaculty joint degree program offered between the Master of Library and Information Studies (MLIS), founded in 1970, and the Master of Arts (MA) in Digital Humanities (formerly, “Humanities Computing”), which admitted its first cohort in 2001. As some of its earliest faculty members note, the development of the DH program was

shaped to ...local circumstances [that] include specific areas of expertise of the two new faculty members..., the research projects and teaching interests of other colleagues at U of A, the physical infrastructure available on campus (such as the types of computer labs already existing or that could reasonably be built), the strengths of the private sector in the regions where some students are most likely to seek employment, and, of course, the interests of the students themselves.<sup>57</sup>

This multifaceted picture of the motivations and constituencies behind U of A’s DH program speaks to the many local contexts that guide curricular development and doubtless reflects the genealogies of many of the DH courses we have considered here.

In surveying the landscape of DH courses within LIS education, we have developed a picture of the extent and content of these courses and discussed their relationship to recent studies of employment in information settings. This representation is useful both abstractly, showing where LIS-inflected DH converges with and diverges from the larger field, and practically, especially for those wishing to develop or expand DH offerings at their own institutions. To that end, we have provided many examples of course titles, learning outcomes, readings, and technologies.<sup>58</sup> Much of our discussion points back to the very themes and values that are said to define DH: interdisciplinarity, collaboration, and critical approaches. Though LIS has instantiated its own versions of these, the DH courses offered in LIS environments still reflect these familiar, albeit varied, hallmarks of the field.

## Acknowledgments

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## Appendix A

List of institutions offering at least one DH course included in this study (those providing syllabi to the study are marked with an asterisk). For a complete list of current ALA-accredited schools please see <http://www.ala.org/educationcareers/accreditedprograms/directory>. For the current list of iSchools please see <https://www.ischools.org/members>.

Institution	iSchool	ALA-accredited
Bar-Ilan University	x	
CUNY Queens College		x
*Dominican University	x	x
Hong Kong Baptist University	x	
*Indiana University	x	x
*Linnaeus University	x	
*National Taiwan Normal University	x	
*Pratt Institute	x	x
Renmin University	x	
*San Jose State University	x	x
Shanghai University	x	
*Simmons University	x	x
St. Catherine University		x
*Syracuse University	x	x
The Catholic University of America		x
*University College London	x	
University of Alberta		x
*University of Amsterdam	x	
*University of Colorado	x	
*University of Glasgow	x	
*University of Illinois at Urbana-Champaign	x	x
University of Iowa	x	x
University of Missouri	x	x
*University of North Texas	x	x
*University of Pittsburgh	x	x
*University of Regensburg	x	
*University of Texas at Austin	x	x
*University of Washington	x	x
University of Western Ontario (Western University)		x
University of Wisconsin-Madison	x	x
Wuhan University	x	

## Appendix B

List of most frequent authors and sources assigned in courses in this study (in alphabetical order).

Anne Burdick et al., *Digital Humanities* (Cambridge, MA: MIT Press, 2012).

Gold, Matthew K., *Debates in the Digital Humanities* (Minneapolis: Univ Of Minnesota Press, 2012), <https://dhdebates.gc.cuny.edu/projects/debates-in-the-digital-humanities>.

Gold, Matthew K., and Lauren F. Klein, eds., *Debates in the Digital Humanities 2016* (Minneapolis, Minn.: University of Minnesota Press, 2016), <https://dhdebates.gc.cuny.edu/projects/debates-in-the-digital-humanities-2016>.

Kirschenbaum, Matthew G., *Mechanisms: New Media and the Forensic Imagination* (Cambridge, MA, USA: MIT Press, 2007).

—, "What Is Digital Humanities and What's It Doing in English Departments?," *ADE Bulletin* 150 (2010): 55–61.

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Kirschenbaum, Matthew, and Sarah Werner, "Digital Scholarship and Digital Studies: The State of the Discipline," *Book History* 17, no. 1 (2014): 406–58, <https://doi.org/10.1353/bh.2014.0005>.

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Posner, Miriam, "No Half Measures: Overcoming Common Challenges to Doing Digital Humanities in the Library," *Journal of Library Administration* 53, no. 1 (January 1, 2013): 43–52, <https://doi.org/10.1080/0193026.2013.756694>.

—, "How Did They Make That? – Miriam Posner's Blog," August 29, 2013, <https://miriamposner.com/blog/how-did-they-make-that>.

—, "What's Next: The Radical, Unrealized Potential of Digital Humanities," in *Debates in the Digital Humanities*, ed. Matthew K. Gold and Lauren F. Klein (Univ Of Minnesota Press, 2016), <https://dhdebates.gc.cuny.edu/read/untitled/section/a22aca14-0eb0-4cc6-a622-6fee9428a357>.

Rawson, Katie, and Trevor Muñoz, "Against Cleaning," *Curating Menus*, July 7, 2016, <http://www.curatingmenus.org/articles/against-cleaning>.

Risam, Roopika, "Beyond the Margins: Intersectionality and the Digital Humanities," *Digital Humanities Quarterly* 009, no. 2 (September 2, 2015).

Schreibman, Susan, Ray Siemens, and John Unsworth, eds., *A Companion to Digital Humanities* (Oxford: Blackwell, 2004), <http://www.digitalhumanities.org/companion>.

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Sula, Chris Alen, "Digital Humanities and Libraries: A Conceptual Model," *Journal of Library Administration* 53, no. 1 (2013): 10–26, <https://doi.org/10.1080/0193026.2013.756680>.

Underwood, Ted, "Topic Modeling Made Just Simple Enough," *The Stone and the Shell* (blog), April 7, 2012, <https://tedunderwood.com/2012/04/07/topic-modeling-made-just-simple-enough>.

Weingart, Scott B., "Demystifying Networks, Parts I & II," *Journal of Digital Humanities* 1, no. 1 (2011), <http://journalofdigitalhumanities.org/1-1/demystifying-networks-by-scott-weingart>.

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## Notes

1. For a useful disambiguation, see Camille Roth, "Digital, Digitized, and Numerical Humanities," *Digital Scholarship in the Humanities* 34, no. 3 (September 1, 2019): 616–32, <https://doi.org/10.1093/llc/fqy057>.
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4. Alan Liu, "Where Is Cultural Criticism in the Digital Humanities?," in *Debates in the Digital Humanities*, ed. Matthew K. Gold (Minneapolis, Minn.: Univ Of Minnesota Press, 2012), 490–509, <http://dhdebates.gc.cuny.edu/debates/text/20>.
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7. ACRL Research Planning and Review Committee, "Top Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries* 75, no. 6 (2014), <https://doi.org/10.5860/crln.75.6.9137>.
8. ACRL Research Planning and Review Committee, "2010 Top Ten Trends in Academic Libraries: A Review of the Current Literature," *College & Research Libraries* 71, no. 6 (2010), <https://doi.org/10.5860/crln.71.6.8385>; ACRL Research Planning and Review Committee, "2012 Top Ten Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries* 73, no. 6 (2012), <https://doi.org/10.5860/crln.73.6.8773>; ACRL Research Planning and Review Committee, "2016 Top Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries* 77, no. 6 (2016), <https://doi.org/10.5860/crln.77.6.9505>; ACRL Research Planning and Review Committee, "2018 Top Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries* 79, no. 6 (2018), <https://doi.org/10.5860/crln.79.6.286>; ACRL Research Planning and Review Committee, "2020 Top Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries* 81, no. 6 (2020), <https://doi.org/10.5860/crln.81.6.270>.
9. San José State School of Information, "MLIS Skills at Work: A Snapshot of Job Postings Spring 2021" (San José State University, Spring 2021), [https://ischool.sjsu.edu/sites/main/files/file-attachments/career\\_trends.pdf?1623860581](https://ischool.sjsu.edu/sites/main/files/file-attachments/career_trends.pdf?1623860581).

10. Though information and library sciences are present throughout mid- and late-twentieth century DH (see Chris Alen Sula and Heather V Hill, "The Early History of Digital Humanities: An Analysis of Computers and the Humanities (1966–2004) and Literary and Linguistic Computing (1986–2004)," *Digital Scholarship in the Humanities* 31, no. Supplement 1 (2019): 190–206, <https://doi.org/10.1093/lhc/fqz072>), many date more contemporary interest in DH—even the name itself—to Susan Schreibman, Ray Siemens, and John Unsworth, eds., *A Companion to Digital Humanities* (Oxford: Blackwell, 2004), <http://www.digitalhumanities.org/companion>. For a historical perspective on DH within LIS, see Marija Dalbello, "A Genealogy of Digital Humanities," *Journal of Documentation* 67, no. 3 (April 26, 2011): 480–506, <https://doi.org/10.1108/0022041111124550>.

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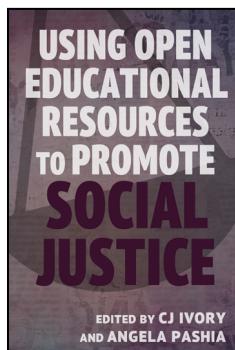
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## *Using Open Educational Resources to Promote Social Justice.*

CJ Ivory and Angela Pashia, eds. Chicago: ACRL Press, 2022, 299p. \$92 (\$82.80 ALA members) ISBN: 978-0-8389-3678-8.



As I reviewed this book in early 2023, several states were demonstrating that they are afraid of the lessons of the past. They see Critical Race Theory (CRT) in education as a threat to academic and secondary institutions. But Open Education Resources (OER) is a game changer to Social Justice and CRT educational areas. CJ Ivory and Angela Pashia share sixteen chapters that discuss the origins of OER and CRT and related issues, including de-colonizing OER and how to support faculty development in social justice using innovative OER platforms. In addition, each chapter offers a plethora of scholarly references in related areas of social justice/DEI and Open Educational scholarly research.

The Open Education framework has shaped my social justice viewpoint and is part of the rubric I use to discern how social justice concepts (e.g., diversity, equity, inclusion, and justice) impact student success rates in completion, retention, graduation, transfers, and beyond. These concepts are linked to the use of openly licensed materials that allow libraries to share their resources globally, empowering individuals to teach, learn, and research.

Several chapters are standouts in this collection. In "Repairing the Curriculum," Kevin Adams and Samantha Dannick showcase how OER work can bridge the gap between Western and Indigenous research. They echo Robin Wall Kimmerer, writing that we must "find an intersection between the worlds of Indigenous wisdom and scientific knowledge" (29). A pluralist society embraces oral histories/knowledge and scientific rigor. The authors added Wall Kimmerer as an example of how open education can coexist with Merriam-Webster's definition of science as a "system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method" ([merriam-webster.com/dictionary/science](https://www.merriam-webster.com/dictionary/science)).

Inside the subchapter relating to a lack of OER in health science education, "Tensions in Developing and Integrating OER for use in Health Disciplines Curricula," I believe there was a missed opportunity to incorporate how OER relates to other Open areas such as Open Data, Access, and Science. This missed opportunity could be because the authors wanted to focus on OER (or lack of) in this field, but the adjacent work could compensate and, in some ways, encourage more Creative Commons licensing materials.

Dawn (Nikki) Cannon-Rech offers important insights in the chapter "Beyond Affordability." Many institutions and secondary schools engage OER work on a continuum between passive and active. At Georgia Southern, a librarian sought to go beyond awareness, developing a "more active and integrated approach to support OER education and advocacy through workshops, semester-long learning communities, and one-on-one consultations." Readers of this book will find Cannon-Rech's "Inclusive Excellence Action Plan" a prime example of a framework that showcases the strength of openly licensed materials and DEIJ.

The strengths of OER have long been lauded, but its weaknesses in addressing the needs of colonized and Indigenous communities continue to be documented. In chapters 9 and 10, authors Josiline Phiri Chigwada and Alkasim Hamisu Abdu discuss these crucial issues. Chig-

wada describes the ways legacies of colonization have shaped how governments and higher education relate to each other and the impact on OER adoption. Abdu addresses the status of OER in the African countries of Zimbabwe, Nigeria, and South Africa.

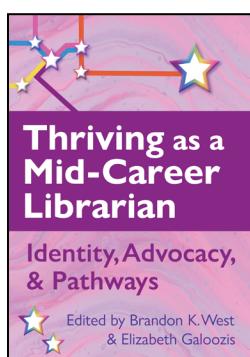
In chapter 15, Barbara Murphy and Claire Terrell show readers how to create equity when working with a music curriculum organized predominately around European white male composers. The authors argue that the “discussions of non-Western music and music theories rarely occur within music theory classes.” They detail how diversity is necessary in both performance ensembles and music theory. Along with a discussion of race and gender biases, the authors share as an example the OER website “Music Theory Materials,” which encourages selections for “women and BIPOC composers.”

The final chapter describes a community OER institute in Caribbean Studies. The primary vision of this institute was “to foster an enhanced community of practice for digital humanities and digital pedagogy specific to the needs and concerns of Caribbean studies.” The institute identified barriers to OER and DH in the discipline, beginning with limited bandwidth and access to platforms in the regions. The authors describe three platforms (The Diaspora Project, the Dutch Caribbean Digital Platform, and Chronicling America) and the ample OER included for digital Caribbean Studies. They point to open source platforms like Omeka as crucial for engaging students. After the institute, participants created an open access site for their OER work, “designed to work as a nexus that links institute information and products in a meaningful way to increase their accessibility and to amplify participant contributions.”

The authors point to limitations brought on by the COVID-19 pandemic and hurricanes as basic needs preempted teaching needs. A larger shift toward global social justice will lead to more OER opportunities in Caribbean studies.

The chapters in this book seek to persuade the reader that OER has its place in social justice concepts in PreK through grade twelve, higher education, and beyond. Higher education reform is daunting, but this book can show the path toward societal change. Overall, the best part of this book showcases how decolonizing openly licensed materials and owning OER platforms are a critical aspect of the OER field. — *Beatrice Canales, San Antonio College*

***Thriving as a Mid-career Librarian: Identity, Advocacy & Pathways.*** Brandon K. West & Elizabeth Galoozis, eds. Chicago, IL: ACRL Press, 2023. 358pp. Paperback, \$92 (ISBN: 978-0-8389-3941-3)



After being in the same position for more than seven years and potentially achieving tenure, academic librarians may be asking themselves “What is next?” or “What more is there for me and my career in librarianship?” *Thriving as a Mid-Career Librarian: Identity, Advocacy & Pathways* aims to provide some perspectives and guidance to answer those questions. By focusing specifically on mid-career academic librarians, this book provides inspiration for those who are interested in continuing to grow, change, and ultimately thrive in their roles. Guidance and inspiration are provided through a variety of perspectives and situations that are described through a blend of personal stories and academic research that allows readers to gain an understanding of how professional lives can change over time. The editors asked authors to “do one or more of the following in their chapters: include marginalized perspectives, address intersectionality, and/or reflect on privilege” (viii).

Chapters are organized into four sections. Section 1, "Staying Engaged in Your Career," focuses on how authors sustain themselves at mid-career. Authors discuss mentorship, pursuing additional advanced degrees, and creative thinking about career ladders. Andrew Weiss's chapter "Boredom and the Tenured Academic Librarian: How Being Bored Is an Essential Component of a Successful Career" empowers readers to find new ways to engage themselves in their work, arguing that boredom is normal and can be a beneficial aspect of a long-term career.

Section 2, "The Role of Identity in Shaping Mid-career Librarianship," is one of the best sections in this book. This section "aims to amplify the stories of librarians who are experiencing mid-career with marginalized identities or abilities" (ix). While all chapters provide unique perspectives and guidance, two are particular standouts. Marta Bladék's "Working toward Promotion to Full Professor: Strategies, Time Management, and Habits for Academic Librarian Mothers" argues for more tenured faculty librarians to aim for full professor rank due to gender disparities and the benefits full rank provides. Andy Hickner's "Learning to Thrive—Not Just Survive—as a Librarian with Mental Illness" offers a perspective into Hickner's own struggle with mental health and how workplace culture and personal practices can improve the lives of librarians with mental illness.

Section 3, "Being Your Own Advocate," focuses on strategies for navigating different work environments and, as the title suggests, navigating for yourself. While most of the chapters focus on advocating for yourself and your needs, admittedly a necessary skill, I especially liked Megan Palmer, Rachel Keiko Stark, Maggie Albro, and Jenessa McElfresh's "Addressing Incivility as a Mid-career Librarian: How to Advocate for a Bully-Free Library." In contrast to the other chapters in this section, this chapter provides strategies for advocating on behalf of others in your workplace. Strategies include direct intervention, education, and long-term strategic planning.

Section 4 grapples with a question many of us face: Should we be the boss? Perhaps it is a requirement when discussing options at mid-career, but there is a section on moving into leadership and administration. This section differs from other resources on the topic in that the authors do not push library leadership as the "right" next step in librarianship. Authors provide a range of ways to lead, from informal leadership (chapter 23) to an example of rotating department heads (chapter 21).

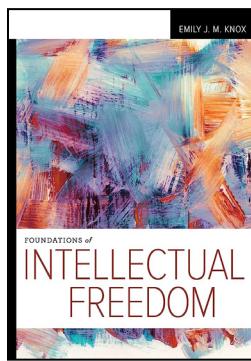
An important thread throughout the chapters is the vastly different experiences one can have as a mid-career librarian. The editors specifically chose to include the word "thriving" in the title because they believe, and the authors agree, that everyone deserves to feel that they are thriving at work, and this collection offers several different ways to thrive. There is no "right way" to move forward during mid-career, but taking time to think through and articulate your values and interests will help identify ways to thrive—even if that means changing positions or institutions.

While this is an excellent resource, a few issues should be acknowledged. As in the field of librarianship, there are many more cis, white, hetero authors than those from other groups, even though the editors tried to make room for marginalized voices. I look forward to future editions that may include more underrepresented authors adding important perspectives to the mid-career conversation. In section 3 (and sprinkled throughout the book), many authors described using their privileges to advocate for others. However, only one chapter explicitly discussed advocating for others. Perhaps this topic is outside the scope of this book, but with

so many authors mentioning advocacy for others I would have liked to see more explicit discussions.

Each chapter may not resonate with every mid-career librarian, but there are certainly at least several chapters that will provide encouragement and ideas for a path forward. Anyone struggling in mid-career should explore the ideas in this book. "Early career" librarians who like to plan ahead and want to see how the future may look would also benefit from browsing some chapters. Although this is the kind of book readers may approach by choosing only the sections whose titles interest them or relate to their experiences the most, librarians at all levels can gain a lot by reading through all the chapters. — *Clarissa Ihssen, American University*

**Foundations of Intellectual Freedom.** Emily J. M. Knox. Chicago: ALA Neal-Schumann, 2023. 144 p. Paper, \$54.99 (978-0-8389-3783-9).



*Foundations of Intellectual Freedom* is an introduction to the concept of intellectual freedom, encompassing its history and intersections with concepts including freedom of expression, censorship, privacy, and copyright. The book follows the outline of the eight-week course Intellectual Freedom and Censorship, taught by author Emily J. M. Knox at the School of Information Sciences at the University of Illinois at Urbana-Champaign. While this text is an excellent accompaniment to that course, it will also be useful for any information professional wanting to develop a foundational understanding of information freedom and recent conversations in the field. In addition to the discussion within each chapter, each chapter ends with an annotated bibliography of recent or important related works a reader may want to review. The titles in the annotated bibliography come at the discussion from a variety of angles and viewpoints. Each chapter also includes a bibliography of cited references. While Knox notes that the focus of the text is intellectual freedom in the context of the United States, she also includes information about internationally focused organizations. She notes that the conversation about intellectual freedom at the time of publication is influenced by the realities of an ongoing pandemic, the insurrection of January 6, 2021, and an increasing number of book challenges.

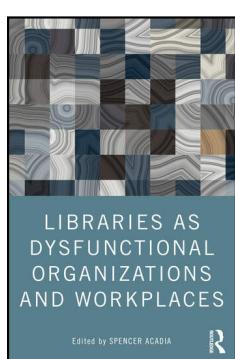
Knox begins by defining intellectual freedom, noting that some definitions focus more on access to information, others are more concerned with freedom of expression, and still others are a mixture of the two. She also includes a discussion of the intersection of intellectual freedom and the foundations of intellectual freedom as a human right. This text provides a good theoretical grounding that includes library focused definitions and theories as well as those from fields outside of librarianship. This reviewer especially appreciated the inclusion of recent discussions about the intersections of intellectual freedom and social justice. Regarding the interplay of intellectual freedom and social justice, Knox notes that many of the recent critiques of intellectual freedom take place in the discourse of critical librarianship. Knox, however, argues in the book's opening chapter that social justice is not possible without intellectual freedom, maintaining that "it is only through the free circulation of ideas that citizens can understand what the terms 'white supremacist,' 'colonialist,' 'heteronormative,' 'ableist,' and 'classist' even mean" (12). While this reviewer appreciates and commends Knox's discussion of the variety of current viewpoints about social justice in libraries, a firmer definition of social justice might have aided the discussion later in the text about access to

information and future directions in the field. There are few easy answers to questions raised by these intersections. By engaging with the text and Knox's suggested related texts, readers are given tools to begin thinking through the topic for themselves. Given the recent increase in the number of book challenges, the discussion of intellectual freedom as not just a legal but a social construct was particularly helpful. This is especially true as it hints at ways of moving forward in the fight against book challenges.

Each of the chapters constitutes a good capsule conversation on its own, and chapters can be read out of sequence according to the interests of the reader. Where necessary, Knox reintroduces vocabulary or concepts that will be helpful in each chapter. In much of the book, the connection to a particular element of intellectual freedom—for example, access to information or freedom of expression—and the topic of the chapter is clearer. In the case of the chapter on copyright and intellectual freedom, this reviewer had more trouble seeing that connection. The discussion of copyright seemed to focus more on freedom of use rather than intellectual freedom per se.

The text does an admirable job of outlining the recent conversation around intellectual freedom and neutrality. Knox includes a discussion of the concept of the "marketplace of ideas" and its critiques. There is also a discussion of the ways neutrality can be perceived as a "shield for prejudice." A related discussion revolves around hate speech, laws against hate speech, and the challenges of implementing such restrictions. Knox argues that these laws may not actually be used to protect marginalized groups. Acknowledging the argument some make that unrestricted intellectual freedom causes harm, Knox leans instead toward the broadest possible interpretation of intellectual freedom. She discusses the relationship between restrictions on intellectual freedom and who has power in the community. While limiting certain forms of expression like hate speech can be appealing, Knox reminds the reader that those who have power decide whose speech is restricted. She also articulates a concern that such restrictions might further consolidate power in the hands of a few. Particularly given recent anti-immigrant rhetoric as well as opposition to diversity and inclusion efforts in library collections and programming, some readers may not be persuaded by Knox's argument. However, it is well articulated and supported, and includes a firm understanding of its critiques. The text and the references give readers a strong grounding in theories of intellectual freedom to make decisions for themselves. This text will be a valuable foundation resource for information professionals in libraries of all types. — *Qiana Johnson, Dartmouth College*

***Libraries as Dysfunctional Organizations and Workplaces.*** Spencer Acadia, ed. New York: Routledge University Press, 2023, 316 p. Paper, \$35.96 ISBN: 978-0-3677-4709-1.



*Libraries as Dysfunctional Organizations and Workplaces* documents the widespread evidence that library workers in North America are unhappy with the libraries where they work. Although the term dysfunction can make the book appear to be geared toward managers with an interest in alleviating those elements of the workplace, the book will appeal to anyone working in or adjacent to the LIS field.

This book, edited by Spencer Acadia at the University of Denver, has three major goals: to critically look at the internal problems of libraries as dysfunctional workplaces, to examine the socio-organizational level as it relates to existing literature, and to provide practical suggestions on how to

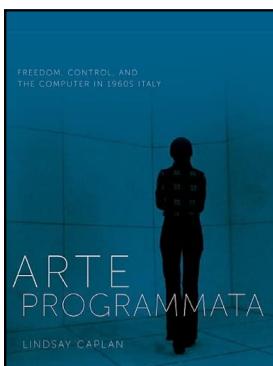
address dysfunction. The book is easy to read. Chapters are written with clarity, and efforts are taken to ensure that readers are working with shared definitions. For example, authors use the 1999 Statt definition of dysfunctional to mean “[...] anything that disturbs the normal functional operations of an organization. It is also used more widely to mean a way of doing things that doesn't work” (3).

The authors explore the factors that lead to dysfunctional workplaces as well as the four types of dysfunction an organization can face. The authors offer four types: low morale/burnout, problematic recruitment and retention, discrimination, and bullying. Although much has been written on the topic of individuals dealing with burnout, the book looks squarely at what the employer can change to stop it. Chapters also examine workplace bullying. Using a survey method, Carol Ann Geary and Spencer Acadia explore the impact of COVID-19 and at-home work on rates of bullying, arguing that bullying is one of the factors of high turnover for academic librarians. Kate Dohe, Celia Emmelhainz, Maura Seale, and Erin Pappas offer a surprising take in their chapter “The Saboteur in the Academic Library.” They assess both the positive and negative outcomes of sabotage. Sabotage can keep work manageable and protect employees from patrons, but it can also create a toxic work environment for BIPOC employees and scare off new hires. Silvia Vong’s chapter, “Bamboo Ceiling Reframed: Exclusion through Social Practices and Structures in Libraries,” sheds new light on dysfunction through an analysis of AAPI interest in management in libraries. Vong’s research demonstrates that 43 percent of the respondents had no interest in management.

Recruitment and retention are key to any organization, so we need to take into consideration a whole-person approach, as Erica Lopez describes in chapter 3: “A whole person approach appreciates humans as complex individuals that interact to form relationships with others and their environments” (73). This approach can also improve the interview process and help demystify the processes of promotion and tenure(83) Adena Brons, Chloe Riley, Ean Henninger, and Crystal Yin address the dysfunction caused by a reliance on precarious labor. As they describe it, precarity is a problem that differs across institutions. This means that “the causes, manifestations, and effects of precarity are multiple and complex; no individual library or library system experiences precarity in precisely the same way” (101). While this means that precarity cannot be solved in one swoop, the chapter offers multiple solutions for the problems discussed.

In total, the authors in this volume examine and discuss the various layers of dysfunction. The library is not the in a void. Libraries exist within higher education structures. Hierarchies in higher education and within the library need to be taken into consideration (288). By discussing this we can look past our institution and at the larger institution and see the same problems. The book has many strengths but a few notable weaknesses. The strongest chapters discuss academic libraries, but only a single chapter focuses on public libraries. Public libraries have different factors to consider, such as library boards and trustees. These are interesting topics that should be covered in a different book. In some cases, chapter titles feel like a shell game with no ball. Tim Ribaric’s “Put the Fucking Salary in the Job Ad!”: An Analysis of an Anonymous Corpus of Tweets” does not discuss salary or job postings but tweets by the account LIS Grievances on Twitter. Although not every chapter will pique the reader’s interest, readers interested in the concept of dysfunction or who want to discover how to improve the library workplace will value this book. — *Kaia MacLeod, University of Calgary*

*Arte Programmata: Freedom, Control, and the Computer in 1960s Italy.* Lindsay Caplan. Minneapolis, MN: University of Minnesota Press, 2022. 328p. Paper, \$33 ISBN: 978-1-5179-0995-6.



*Arte Programmata: Freedom, Control, and the Computer in 1960s Italy*, by art historian Lindsay Caplan, adds a fresh perspective to narratives about art and technology. The book also has much to offer those working in the field of library and information science. *Arte Programmata* takes us deep into how Italian artists of the 1960s and 1970s engaged with information theory and the idea of computers. It also expands understanding of Italian art of this period, focusing on lesser-known artists and collectives like Bruno Munari, Enzo Mari, Gruppo N, and Gruppo T. The book is not only a well-researched art history, however; it is also a meditation on the broad concepts of freedom and control as they are enacted in and emerge from technological frameworks. In analyzing the work of Arte Programmata artists and drawing on contemporary critical theory about technology and society, Caplan makes the intriguing argument that “programming, planning, and control are not categorically antithetical to individual freedom but form the conditions that enable and encourage subjective agency” (3).

Caplan’s interdisciplinary approach expands the book’s appeal to readers from a variety of disciplines. She deftly blends traditional formal analysis of artworks with intellectual histories of topics like cybernetics and the Italian Left, all while eliciting the implications of politics, capitalism, and the state. The idea of the “program” underpins the book’s argument, and it is worth noting that in *Arte Programmata* programming means something different from what readers might expect. The artists Caplan discusses did not program computers, but rather were inspired by concepts like algorithms and the principle that “a simple, logical structure can generate an unforeseeable number of possible forms” (35). In the book, programming refers to a wide swath of concepts from algorithm-inspired art to Italian governmental economic planning (*programmazione*).

Chapter 1 situates the 1962 exhibition *Arte programmata: Arte cinetica, opere multiplication, opera aperta* in the context of earlier pieces from the same artists and Umberto Eco’s “open work,” while chapter 2 charts a shift in artists’ output from geometric art and kinetic sculpture to immersive environments inspired by cybernetics. Caplan outlines how Arte Programmata artists collectivize authorship, in part in reaction to other movements such as *arte informale* (which privileged the expression of an individual genius) and the *artista impegnato* (who creates art to express an external, existing political agenda). Though Umberto Eco’s open work was a major interpretive key at the time, Caplan suggests that it’s more complicated than that: while the works suggest infinite permutations, they also enclose and constrain. The tension between possibility and constraint is the site of collaborative creation. As Caplan writes, information theory and programming appealed to Eco and the Arte Programmata artists because “each offered a way to conceive the activity of individuals...as stemming from shared material, social conditions rather than a uniquely subjective or metaphysical state” (68). Caplan then focuses on immersive environments (*ambienti*). She expands on how the artists created spaces and situations that resulted in specific experiences of the world: in other words, how they went from “programming art to programming their audience” (89). The strategies of the Arte Programmata artists are interpreted as an antidote to the individualizing effects of mass media, especially television, and the imbrication of these media with capitalist consumer

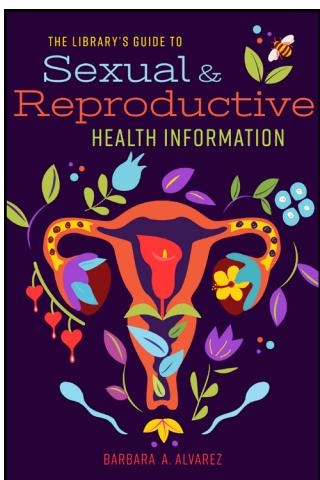
culture. Looking at the approach of Arte Programmata artists to information theory and cybernetic environments is an opportunity to think with them: how might they inspire us to design interfaces or service points differently?

In chapter 3, Caplan develops earlier threads on information theory, situating the Italian artists of Arte Programmata among examples of computer art from elsewhere in Europe and the United States. Caplan argues that Arte Programmata artists reacted negatively to the political implications and understanding of information espoused by other computer artists. Arte Programmata's work—and Caplan's interpretations of it—shine light on *information as system* as opposed to information as meaningful message or content. This distinction makes this book a wonderful complement to writings on information from other disciplines, such as Sianne Ngai's fascinating work on the aesthetic category of the interesting, read through the lens of the material forms of bureaucracy like documents in her book *Our Aesthetic Categories*. For librarians and archivists, mathematical information theory can feel removed from our everyday concerns, which often understand information as content—individual, meaningful messages. As Caplan writes, Arte Programmata's focus on information theory's description of "the conditions, possibilities, and limits of communication of any signal—that is, the situation as a whole...took the Italians to a unique place politically, since to them, the 'situation' included the relationships between people, the composition of their audience, and the networks and codes that connect them" (133). Such a sociotechnical lens on interaction is a complement to ideas about media, misinformation, and other salient topics that emerge from analysis of document and evidence-interested conceptual art.

In chapter 4, we see how the work of Arte Programmata artists inspired by information theory continued as they turned to design. A main point is that the Arte Programmata artists understood their position inside of social and political environments. They thought through not just how to oppose dominating systems such as capitalism, but also how to envision alternatives from within. This view prompts a library studies question: How can systems of constraint and control such as library catalogs be sites for change? Caplan offers the politics of form, which contrasts understanding of the political nature of artworks as "external referent, subject matter, or content" (5). Through form, she contends, we can "recognize the social nature of Arte Programmata's artistic experiments and how their interest in new media is correctly understood as a commitment to understanding people as both subjected to their environment and as agents capable of shaping it" (5). Like the works of Arte Programmata artists, the forms we generate as information professionals can be (and already are) analyzed for such political implications. Within discussions of inclusive and critical cataloging, the potential harms of authority control and the rigidity of our data structures are rightly problematized and contested. Caplan's idea that control and "programmed" environments might in some ways "enable and encourage subjective agency" is worth considering. — Alexandra Provo, New York University

***The Library's Guide to Sexual & Reproductive Health Information.*** Barbara A. Alvarez. Chicago, IL: ALA Editions, 2023. 136p.

Barbara A. Alvarez's *The Library's Guide to Sexual & Reproductive Health Information* comes at a time when libraries across the United States are, quite literally, under attack for providing to our various patrons' materials and resources related to these issues. This handy resource offers strategies for meeting these information needs. The book is divided into three parts:



“Foundation,” “Education,” and “Implementation.” Though largely intended for public library workers, key concepts can be applied to a variety of library settings, including school and academic libraries.

Part 1 provides relevant background information on sexually transmitted infections, sexuality, contraception, etc. Chapter 1, “Introduction to Sexual and Reproductive Health,” offers crucial definitions of terms used throughout the book. For example, the author outlines the scope of sexual and reproductive health as “people [having] bodily autonomy, are empowered to make choices that are best for them, and are equipped with credible information, resources, and tools to make those choices” (4). This breakdown is simple yet useful, as it comprehensively lays out *this* author’s definition and interpretation so that it will not be misconstrued throughout the text.

In chapter 3, “Sexuality,” Alvarez offers basic, real-world tips for library workers who want to provide a more gender-inclusive environment for their patrons in a section titled “Gender Inclusivity at the Public Library.” Recommendations include refraining from exclusive “Mommy & Me”-type programs, instead opting for inclusive, general caregiver language. Alvarez also makes a case against requiring staff to include their pronouns in emails or lanyards, as some may feel unsafe doing so. Alvarez is persistent in noting the importance of keeping staff safe.

Alvarez tackles sexual health in the second section, “Education.” Diving into existing legislation targeting sex education in schools, the author boldly states that public library workers have “opportunities to fill in the gaps or to complement the existing curricula in our libraries’ school districts” (40). This isn’t new information for library workers, as I’m sure most of us have been tuned in to the news and have seen attacks on libraries for the materials we provide. However, Alvarez makes a point to include statistics on harmful “Don’t Say Gay” legislation, driving home the need for library workers to, at the very least, be aware of and remain informed about developments in their own states.

To this reviewer, the book would have been lacking if the author hadn’t included information on abortion. Dedicating several pages to this topic, Alvarez gives library workers an overview of the different types of abortion procedures. In addition, she provides statistics about abortion from organizations, including the Centers for Disease Control and Prevention (CDC), the American College of Obstetricians and Gynecologists, and the *Journal of Adolescent Health*. Alvarez notes that while library workers may hold various feelings and viewpoints about abortions, it is “necessary to provide comprehensive information about sexual and reproductive health, including abortion care” (61). Though this might be considered common sense, it is worth reiterating.

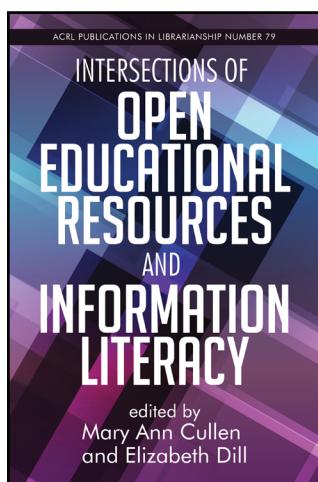
The final section, “Implementation,” gives real-world examples of ways library workers can incorporate themes at their own libraries. Alvarez breaks up the tips by topic: Reference, Collection Development, and Programs and Community Collaborations. The tutorials section can be applied to multiple library settings. Here, Alvarez reminds readers to ask themselves questions like “What do you wish that you had known about this topic?” and “What gaps do you see in the community or school curriculum, and how can a tutorial close those gaps?” when developing tutorials (95). Regarding sexual and reproductive health, tutorials can be extremely helpful, especially for patrons who are uncomfortable speaking to library staff about their inquiries.

There is also real value in the reflective questions Alvarez poses at the end of each chapter. These questions force the reader to think critically, not only about their own understanding of the various topics but how library workers might address patrons and their various sexual and reproductive health information needs. Among the best questions Alvarez asks readers are "What different types of community groups does your library serve?" and "How can you ensure that sexual and reproductive health resources are inclusive to those groups?" (27). While these questions are primarily posed to public library workers, academic librarians will also benefit from reflecting on the question in the context of their own institutions, brainstorming potential campus partnerships for resource sharing.

Not to be overlooked, the appendix serves almost as its own resource guide for readers. Organized by themes such as Sexual Pleasure and Consent and Reproductive Justice, Alvarez supplies readers with books, articles, and organizations, encouraging readers to go beyond this pivotal text.

Alvarez, a 2022 *Library Journal* Mover & Shaker award recipient, will continue to make waves with this timely volume. Serving as a resource guide sprinkled with applicable tips, her book does not shy away from diving into topics currently under fire in libraries. Librarians looking for a title that will challenge and expand their knowledge of sexual and reproductive health information should add *The Library's Guide to Sexual & Reproductive Health Information* to their to-be-read list.— *Jasmine Shumaker, University of Maryland, Baltimore County*

***Intersections of Open Educational Resources and Information Literacy.*** Mary Ann Cullen and Elizabeth Dill, eds. Chicago: Association of College and Research Libraries, 2002. 386p. Paper, \$112.00 (ISBN 978-0-8389-3673-3).



Open educational resources (OER), open pedagogy, and information literacy are increasingly important topics in academic libraries. This book connects these trends together in an approachable and inspiring volume that will be useful for both novices and those with years of experience. The book includes practical takeaways that can be implemented on a small scale, such as a one-shot library instruction session, or in larger projects that use open pedagogy in a semester-long course, or that advocate for OER use across campus.

The editors provide an excellent introduction and first chapter. Elizabeth Dill, Director of University Libraries at the University of Hartford, describes her personal experience as an "accidental OER practitioner." She details her experience of teaching an introduction to theater course with very little advance notice or preparation. She used open pedagogical practices as well as OER texts to successfully engage her students. Mary Ann Cullen, Associate Department Head at Georgia State University's Alpharetta Campus, also became involved with OER as a response to an immediate need on campus. She discusses her experience of volunteering to help with a campus-wide project to replace expensive course textbooks with OER. She not only helped faculty find OER but also advised on topics such as Creative Commons licenses and electronic publishing formats. These personal experiences frame a pragmatic and relevant approach to the subject matter. Chapter authors work in a wide variety of positions at institutions ranging from community colleges to research universities and

corporate libraries. The variety of experiences that the authors bring to this book strengthen its applicability to a wide audience.

The book is divided into six distinct sections: "Foundations," "Teaching Info Lit with OER," "Librarian Support of Open Pedagogy / OER," "Social Justice / Untold Stories," "Student Advocacy," and "Spreading the Love: Training Future Advocates and Practitioners." The first chapter provides ample definitions and background information to equip those new to the topic with confidence to read further. While several chapters promote the idea that open pedagogical practices that incorporate the use of OERs and information literacy concepts are best addressed over a semester-long course, there are several ideas for one-shot library instruction sessions. Topics discussed include ideas for specific lesson plans that address various aspects of the Framework for Information Literacy for Higher Education, methods for locating OER for courses, hiring and training interns or student staff to advocate for OER on campus, talking about OER with faculty, and assignment design concerning the use, evaluation, or creation of OER. Each chapter concludes with a lengthy bibliography, and some chapters also include appendixes with sample classroom materials.

The section that ties OER, open pedagogy, and information literacy in with social justice and critical librarianship is of particular interest. These two chapters are compelling and include both pragmatic examples from real life situations and theories that can help make these connections. Regrettably, this is one of the shorter sections of the book, but the chapters are substantial, leaving the reader with a lot to consider. The Student Advocacy section details two case studies that may influence and motivate those who seek to start wider discussions about OER on their campuses.

In keeping with the subject matter, the editors provide an open access version of the book, available via a link from the American Library Association's online store. *Intersections* is an excellent resource for those interested in open education and information literacy theory. Its practical takeaways and wide range of topics make it valuable for novices and experts alike.

— Laura Wilson, College of the Holy Cross