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Editorial

Updates, Activities and Gratitude

The March 2024 issue was my last update about the internal projects and plans for *College & Research Libraries*. Like other ACRL committees and groups, the C&RL Editor writes an annual report and workplan to share the past year's accomplishments and the goals for the year moving forward. For transparency, in terms of *C&RL's* internal processes and planning, this editorial includes some updates, a few accomplishments, and work plan activities for the 2024-2025 year.

All of this work happens because of the work and guidance from a large community of people which includes the Editorial Board, Book Reviews Editor, Social Media Editor, ACRL staff members David Free and Dawn Mueller, copyeditors, ACRL members, authors, reviewers, readers, researchers, librarians, students, and likely more people I am missing. As I embark on my third year as *C&RL* editor, I express gratitude in having the privilege to work with and learn from you all in this capacity.

Selected Accomplishments, 2023-2024

- In spring 2024, three Editorial Board members, Michelle Demeter, Adrian Ho and Book Reviews Editor Melissa Lockaby formed a subgroup to collect information, assess, and identify *C&RL*'s stance on Artificial Intelligence (AI). They will report on their findings and recommendations to the Editorial Board in late 2024/early 2025.
- In spring 2024, the *C&RL* Editorial Board approved a change in the Author Guidelines to accept submissions that have been deposited in preprint repositories prior to consideration for *C&RL* peer review. Prior to this change, it was not permissible to submit manuscripts that had already been published.
- The January 2024 issue was a topical issue on Equitable and Scholarly Communications. It was guest-edited by Nathan Hall, Kara Malenfant and Amanda Nichols Hess and served as a follow-up from the ACRL Research and Scholarly Environment Committee's (ReSEC) 2019 publication "Equitable and Scholarly Communication."[1] ReSEC proposed this issue "to showcase new research on how the academic and research library workforce has accelerated change in the scholarly communications environment. Given the focus of *Open and Equitable Scholarly Communications* on valuing different ways of knowing, the committee also welcomed adventurous scholarship, and encouraged work on issues of equity, diversity, and inclusion as they relate to academic libraries and scholarly communication" (Hall, et al).[2]
- In November 2023, the Editor participated in an online panel titled "AI and LIS Publishing" with other LIS journal editors from publications such as *Portal, Journal of Information Literacy*, *Journal of the Medical Library Association*, *Communications in Information Literacy* and the *Journal of Academic Librarianship.* Panelists shared their thoughts, policies and experiences on generative Artificial Intelligence (AI) in the processes of each journal, respectively. It was a very informative experience and the editors, and now the new incoming editor, Michelle Demeter, continue to meet to discuss and share their projects

and other work as journal editors. It has been and continues to be very beneficial to learn with and from other editors.

Selected Work Plan Activities, 2024-2025

- Facilitate a peer review workshop for current and prospective *C&RL* peer reviewers. With the Editor-Designate Michelle Demeter and representation from the *C&RL* Editorial Board, all *C&RL* peer reviewers and ACRL membership and beyond will be invited to participate in an online, synchronous workshop about peer reviewing *C&RL* submissions. This workshop is intended to provide guidance on peer review expectations, giving constructive feedback for authors and to provide transparency into how peer review responses fit into the process of publication.
- Artificial Intelligence (AI) Task Force (subgroup of *C&RL* Editorial Board) continues exploratory work to recommend *C&RL* policies and other guidance on AI in the journal's work processes.
  This subgroup of the Editorial Board will present their findings and recommendations for *C&RL* AI policy and other guidance to the Editorial Board to discuss and establish new guidance or policy.

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Notes

1. Maron, N., Kennison, R., Bracke, P., Hall, N., Gilman, I., Malenfant, K., Roh, C., & Shorish, Y. (2019), *Open and Equitable Scholarly Communications: Creating a More Inclusive Future,* Chicago: Association of College and Research Libraries.

2. Amanda Nichols Hess, et al. "Introduction to *C&RL* Topical Issue: Open and Equitable Scholarly Communications." *College & Research Libraries*, vol. 85, no. 1, 2024, pp. 2–6, https://doi.org/10.5860/crl.85.1.2.

Exploring First-Generation Student Experiences with OER Textbooks

Sarah LeMire, Kathy Christie Anders, and Terri Pantuso

As academic librarians engage in Open Educational Resources (OER) creation and adoption programs, exploring student perceptions of OER provides information that can be used to revise and improve OER, to inform faculty perceptions, and to contextualize the benefits of OER in relation to student financial concerns. This case study explores how first-generation students perceive their textbooks, particularly in the areas of cost savings and format. It also supports research indicating that first-generation students are concerned about the cost of textbooks and experience financial challenges, such as food insecurity. Adopting OER may ease financial concerns and increase access to higher education for first-generation students.

Introduction

It is no secret that textbook costs have become prohibitively expensive for students; students commonly are expected to budget around $1,000 per academic year just for textbooks and supplies. The high cost of textbooks means that many students forgo purchasing required course materials, even though it could impact their grade in the course.[1] Academic libraries have been supporting faculty wishing to adopt open educational resources (OER) as a means to increase textbook access for students. OER, as defined by UNESCO, are "the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes."[2] OER include a variety of types of teaching materials, not just textbooks. OER permissions are typically defined in terms of the '5R's': "users are free to Retain, Reuse, Revise, Remix and Redistribute these educational materials."[3] The types of support and leadership that libraries provide for OER development and adoption range from guiding faculty to OER to publishing OER themselves.

When the authors began to collaborate to create an open textbook for an introductory composition course, ENGL 104, it became clear during the development process that it would be beneficial to understand more about student perceptions of this new OER, as well how students viewed the impact of textbook costs. Assessment of the student population's needs became a key part of the OER adoption process, particularly as the university began an initia-

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tive to increase student success for underserved populations.

First-generation students are an underserved population that has been the target of recent efforts to improve retention and graduation rates at Texas A&M, one of the largest public research universities in the country. One reason that first-generation students may demonstrate gaps in student success is due to family income disparities. Texas A&M's student body is generally relatively affluent. According to the *College Mobility Report Cards* from Raj Chetty et al., Texas A&M ranks third out twenty-seven highly selective public universities for students from families in the top 20 percent income bracket ($110,000 annually or more), but eighteenth for students from families from the lowest 20 percent bracket ($20,000 annually or less).[4] Recent demographic information published by the university revealed that only 12 percent of the undergraduate student body reported a family income of less than $60,000.[5] However, an outsized portion of those families are likely to have first-generation students; 63 percent of first-generation students at the university reported a family income of less than $60,000.[6]

In order to better understand the experiences of first-generation students with an OER textbook, the researchers invited both continuing-generation and first-generation students enrolled in ENGL 104 to share their perceptions of their textbooks, including the newly developed OER textbook and the standard fee-based textbook pack. The research questions for this study are as follows:

- Do first-generation students have different perceptions of their textbooks than continuing-generation students in terms of factors such as format, costs, and availability?
- What aspects of textbooks are most important to first-generation students?

By gathering data about first-generation student perceptions of the new OER, the researchers hoped to use those perceptions to show faculty members what the students valued in OER, which may be different than what faculty value in OER. While there are a few studies that broadly explore student perceptions of OER, in this case the researchers wanted to measure the perceptions of TAMU first-generation students in order to connect to a key student success initiative on campus.

Literature Review

Adopting OER materials for higher education has been shown to either benefit student academic performance in many cases or, at the very least, to not harm it. Literature suggests that adopting an OER textbook for a class may either increase student performance or result in student performance that was comparable to that of students using a commercial textbook.[7] This may be due to the increased access that comes from having freely available textbooks.

Broad student perceptions of OER textbooks are equal to or more favorable than traditional textbooks.[8] After surveying community college students enrolled in math courses that used open materials, Hilton III et al. found that "83% either strongly agreed or slightly agreed with the statement, 'Overall, the materials adequately supported the work I did in class.'"[9] Similarly, a study of students at Ohio State University found that student responses to the adoption of open learning materials were largely positive.[10] Students were also very likely to recommend OER courses to their peers according to Brandle et al.[11] Ozdemir and Hendricks concluded that faculty also had many reasons for adopting OER textbooks, including the ability to repurpose the content, favorable views of the quality of open content, concerns about the accessibility of traditional textbooks, and the desire to lower textbook costs for students.[12]

According to student perception surveys conducted at research universities, the high cost of textbooks harms academic performance. At Old Dominion University, researchers found that nearly 38 percent of students they surveyed had forgone purchasing course materials due to cost, and nearly 20 percent thought they had received a lower grade in a class because they could not purchase their textbooks.[13] In their survey of students in British Columbia, Jhangiani and Jhangiani found approximately 30 percent of surveyed students said that textbook costs had led them to receive a lower grade, and that, "these individuals were more likely to self-identify as a member of a visible minority group…hold a student loan…and be working more hours per week."[14] There are clear indications that textbooks costs are creating barriers to student success.

Students from different demographic groups experience textbook cost harms in varying degrees; the adoption of OER texts, while helpful for everyone, can be substantially beneficial to students from underserved populations, such as those who are eligible for Pell Grants, by lowering their D/F/W (D grade, F grade, withdraw) rates.[15] This suggests that first-generation students may benefit from access to OER in their classes. Studies from both Gettysburg College and a public Hispanic Serving Institution in Southern California found that first-generation students were more likely to report textbook cost-related stress and to choose not to purchase required textbooks, potentially impacting their success in the course.[16] Benefits for first-generation students also are not limited to financial relief; Amy T. Nusbaum found that first-generation students who used an OER specifically designed for inclusivity showed an increase in their sense of belonging on campus.[17]

This study contributes to the body of literature on first-generation students and OER textbooks by examining first-generation student perceptions of their textbooks including format preferences, access methods, and awareness of OER during course registration.

Methods

In order to determine student perceptions of their textbooks, the researchers created and disseminated a survey to students enrolled in ENGL 104 Composition and Rhetoric classes during the Fall 2019 semester. After receiving IRB approval, the researchers contacted faculty and graduate students teaching sections of ENGL 104, regardless of the textbook they chose to use for the semester. Instructors were asked to share the survey with their students and to consider offering extra credit to students who participated. Instructors who chose to offer extra credit were also provided with an alternative assignment for students who chose not to participate but wanted the extra credit opportunity.

The survey was designed to explore select areas of investigation related to OER and textbooks. Specifically, the researchers wanted to better understand financial barriers related to textbook costs, student textbook preferences, and student experiences with OER. Survey questions included both qualitative and quantitative questions. The survey also contained questions in a variety of formats such as Likert-style, multiple choice, multiple answer, and free-text. The qualitative responses were imported into Excel and coded thematically by a single researcher and analyzed to identify patterns in responses. Quantitative responses were imported into Stata for analysis. The researchers ran descriptive statistics, including means and frequencies. In order to determine whether differences between first-generation and continuing-generation students were statistically significant, the researchers ran regression analyses in Stata.

Results

There were 206 complete survey responses from fifteen sections of the course. Of those 206 responses, one was dropped due to insufficient information in responses about the type of textbook used in their course. The final data set included 205 total records: 146 from sections that used the OER textbook, and fifty-nine from sections that used commercial textbooks.

Student responses to demographic questions indicated that 132 respondents (64 percent) were sophomores, followed by fifty-six (27 percent) freshmen, fifteen (7 percent) juniors, and two (1 percent) who selected "other" as their class standing. The vast majority, 96 percent, (196) of respondents were not transfer students; only 4 percent (nine) identified themselves as transfer students. Seventy percent of respondents (144) were continuing-generation students, while 30 percent (61) were first-generation students, meaning here that neither parent had graduated from a four-year college or university.

In order to better understand how students' experiences may have varied based on the textbook they used in their class, the researchers asked respondents to select or write in the name of the textbook they used in ENGL 104. Based on students' responses, the researchers coded the respondents as having used the OER or having used a commercial textbook.

In accordance with the design of the study, the results revealed salient points related to first-generation students' financial concerns, textbook preferences and access methods, and awareness of OER.

Financial Concerns

Despite the overall relative affluence of the Texas A&M student body, survey participants commonly indicated that they had financial concerns. The survey asked participants to answer Likert-style questions indicating how frequently they had concerns about the cost of college, cost of textbooks, access to meals, and the need to work. Both continuing-generation students and first-generation students indicated that they had some of these financial concerns, particularly with regard to the cost of college and of textbooks (Table 1). Those concerns become even

TABLE 1
First-Generation and Continuing-Generation Student Financial Concerns (Descriptive Statistics)

		N	Mean	Std. dev.	Min	Max	25th	50th (Median)	75th
College Cost	First Gen	61	4.33	0.91	1	5	4	5	5
	Continuing	144	3.37	1.3	1	5	2	4	4
	Combined	205	3.65	1.27	1	5	3	4	5
Cost of Textbooks	First Gen	61	4.18	0.85	2	5	4	4	5
	Continuing	144	3.25	1.3	1	5	2	3	4
	Combined	205	3.53	1.26	1	5	3	4	5
Access to Meals	First Gen	61	3.2	1.29	1	5	2	3	4
	Continuing	144	2.33	1.23	1	5	1	2	3
	Combined	205	2.59	1.31	1	5	2	2	4
Needing to Work	First Gen	61	3.74	1.28	1	5	3	4	5
	Continuing	144	2.76	1.4	1	5	1	3	4
	Combined	205	3.05	1.44	1	5	2	3	4

more marked among first-generation students. First-generation students were significantly more likely to indicate that they were frequently concerned about the cost of college, cost of textbooks, access to meals, and having to work (Table 2).

TABLE 2
First-Generation and Continuing-Generation Student Financial Concerns (Regression Analysis)

	Estimate	Standard Error	t-value	*p*-value
Cost of College				
Intercept	3.37	.10	33.76	0.000
First Gen/Continuing	.96	.18	5.25	<0.001*
Cost of Textbooks				
Intercept	3.25	.10	32.86	0.000
First Gen/Continuing	.93	.18	5.13	<0.001*
Access to Meals				
Intercept	2.33	.10	22.45	0.000
First Gen/Continuing	.86	.19	4.53	<0.001*
Need to Work				
Intercept	2.76	.11	24.17	0.000
First Gen/Continuing	.98	.21	4.69	<0.001*
*= $p < 0.05$				

Important Aspects of Textbooks

First-generation and continuing-generation students also exhibited differences in the importance they placed on different aspects of their textbooks. OER and commercial textbooks can have differences ranging from aesthetics (production value) to cost. Using a Likert-scale question, students were asked to indicate the importance of four different aspects of textbooks: format (digital, print, or both), cost, professional appearance, and comprehensiveness (having everything in one place).

Results indicated that, in general, students felt that having everything in one place was the most important aspect of their textbook, followed closely by cost. Format was less important, and production value was the least important aspect according to students (Table 3).

TABLE 3
First-Generation and Continuing-Generation Student Important Aspects of Textbooks (Descriptive Statistics)

		N	Mean	Std. dev.	Min	Max	25th	50th (Median)	75th
Textbook Format	First Gen	61	3.3	1.22	1	5	3	3	4
	Continuing Gen	144	3.08	1.12	1	5	2	3	4
	Combined	205	3.15	1.15	1	5	2	3	4
Textbook Cost	First Gen	61	4.31	0.94	2	5	4	5	5
	Continuing Gen	144	3.79	1.08	1	5	3	4	5
	Combined	205	3.95	1.06	1	5	3	4	5

TABLE 3
First-Generation and Continuing-Generation Student Important Aspects of Textbooks (Descriptive Statistics)

		N	Mean	Std. dev.	Min	Max	25th	50th (Median)	75th
Professional Production	First Gen	61	2.95	1.13	1	5	2	3	4
	Continuing Gen	144	2.82	1.14	1	5	2	3	4
	Combined	205	2.86	1.14	1	5	2	3	4
Comprehensiveness	First Gen	61	4	0.82	1	5	4	4	4
	Continuing Gen	144	4	0.94	2	5	3	4	5
	Combined	205	4	0.9	1	5	4	4	5

In order to understand if first-generation and continuing-generation students exhibited different priorities, the researchers ran a regression analysis for each of the four aspects considered (Table 4). Although first-generation students ranked each aspect of the textbook as highly or more highly than their continuing-generation peers, these differences were small in relation to textbook format, production, and comprehensiveness. However, first-generation students rated the importance of cost significantly higher than continuing-generation students.

TABLE 4
First-Generation and Continuing-Generation Student Important Aspects of Textbooks (Regression Analysis)

	Estimate	Standard Error	t-value	*p*-value
Textbook Format				
Intercept	3.08	.096	32.22	0.000
First Gen/Continuing	.212	.175	1.21	.229
Textbook Cost				
Intercept	3.79	.087	43.82	0.000
First Gen/Continuing	.52	.159	3.28	0.001*
Professional Production				
Intercept	2.82	.095	29.66	0.000
First Gen/Continuing	.131	.174	.75	.452
Comprehensiveness				
Intercept	4	.075	53.08	0.000
First Gen/Continuing	0.00	.138	0.00	1.000
*= $p < 0.05$				

Course Materials Access Methods

Survey results also revealed trends in how students access online course materials. Students were asked how frequently they used different devices to access their materials with a score of 1 for Never and a score of 4 for Frequently. Results revealed that students were most likely to use laptops and least likely to use tablets. Very few students selected the "Other" option, indicating that the device options were those most commonly used.

Additional trends were revealed when the data was broken out by first-generation and continuing-generation students. Both populations most commonly used laptops, but first-generation students were significantly more likely to use a desktop computer and to use their phones to access course materials.

TABLE 5
First-Generation and Continuing-Generation Student Course Materials Access Methods (Descriptive Statistics)

		N	Mean	Std. dev.	Min	Max	25th	50th (Median)	75th
Desktop Computer	First Gen	61	2.36	1	1	4	2	2	3
	Continuing Gen	144	1.99	1.01	1	4	1	2	3
	Combined	205	2.1	1.02	1	4	1	2	3
Laptop Computer	First Gen	61	3.84	0.52	1	4	4	4	4
	Continuing Gen	144	3.82	0.48	2	4	4	4	4
	Combined	205	3.82	0.49	1	4	4	4	4
Tablet	First Gen	61	1.67	1.08	1	4	1	1	2
	Continuing Gen	144	1.56	0.92	1	4	1	1	2
	Combined	205	1.59	0.97	1	4	1	1	2
Phone	First Gen	61	2.69	0.99	1	4	2	3	3
	Continuing Gen	144	2.08	0.99	1	4	1	2	3
	Combined	205	2.26	1.02	1	4	1	2	3
Other	First Gen	61	1.18	0.7	1	4	1	1	1
	Continuing Gen	144	1.05	0.27	1	3	1	1	1
	Combined	205	1.09	0.45	1	4	1	1	1

TABLE 6
First-Generation and Continuing-Generation Student Course Materials Access Methods (Regression Analysis)

	Estimate	Standard Error	t-value	*p*-value
Desktop				
Intercept	1.99	.084	23.66	0.000
First Gen/Continuing	.375	.154	2.43	.016*
Laptop				
Intercept	3.82	.041	92.66	0.000
First Gen/Continuing	.017	.076	.22	.826
Tablet				
Intercept	1.56	.081	19.24	0.000
First Gen/Continuing	.117	.148	.79	.432
Phone				
Intercept	2.08	.082	25.31	0.000
First Gen/Continuing	.605	.151	4.01	<0.001*
Other				
Intercept	1.05	.037	28.46	0.000
First Gen/Continuing	.132	.068	1.95	.053

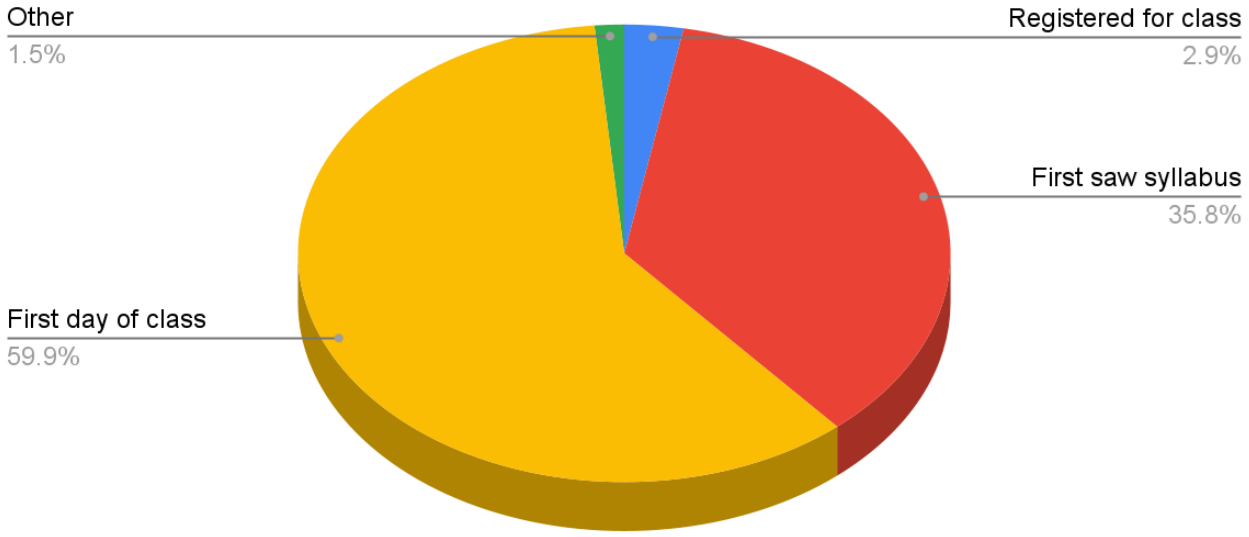
*= $p < 0.05$

Awareness of OER

Texas A&M University has a course marking system, or a way to tag courses using an OER in the class schedule. Because of this system, it was possible that students could learn their course had an OER textbook as early as during class registration. To determine whether students indeed learned that their course was using an OER at the point of registration, the survey asked students who identified their class as having an OER at what point they learned that their class textbook would be an OER.

Although this information was available through the registration system, survey results revealed that only a handful of students, 2.9 percent (four), learned that their class had an OER during the registration process (Figure 1). Instead, most students learned that they had an OER around the time that courses began, either on the first day of class, at 59.9 percent (82), or when they first saw the course syllabus, at 35.85 percent (49).

FIGURE 1
When Students in OER Sections of ENGL 104 Learned Their Class Had an OER Textbook Format Preferences



Students were asked which textbook formats they preferred: print, electronic, or a combination of the two. A combination of print and electronic formats was preferred by 37 percent of respondents (76). Electronic only, at 29 percent (60), and print only, at 26 percent (53), were nearly even in popularity. Eight percent (16) of students expressed no preferred textbook format.

TABLE 7
Preferred Textbook Format

Preferred Format	Number of Respondents
Print textbooks	53
Electronic textbooks	60
Print with an electronic copy	76
No preference	16

The researchers included an optional free-text question asking the reasons for respondent textbook format preferences. The researchers then coded these questions to uncover patterns in participant responses which are detailed in Table 8 below. Individual responses could include multiple codes.

TABLE 8
Most Frequent Reasons for Textbook Preferences

Code	Electronic Only *Number of Responses*	Electronic Only *% of Respondents (58)*	Print Only *Number of Responses*	Print Only *% of Respondents (44)*	Print with Electronic Copy *Number of Responses*	Print with Electronic Copy *% of Respondents (66)*
Academic performance	1	2%	12	27%	6	9%
Ease of access	32	55%	7	16%	17	26%
Highlighting/ notes	1	2%	9	20%	13	20%
Multiple access options	0	0%	0	0%	23	35%
Physical access	0	0%	9	20%	9	14%
Portability	26	45%	2	5%	21	32%
Searchability	11	19%	1	2%	2	3%
Environment	2	3%	0	0%	0	0%
Cost	4	7%	0	0%	0	0%
Readability	3	5%	16	36%	0	0%
Efficiency	0	0%	0	0%	2	3%

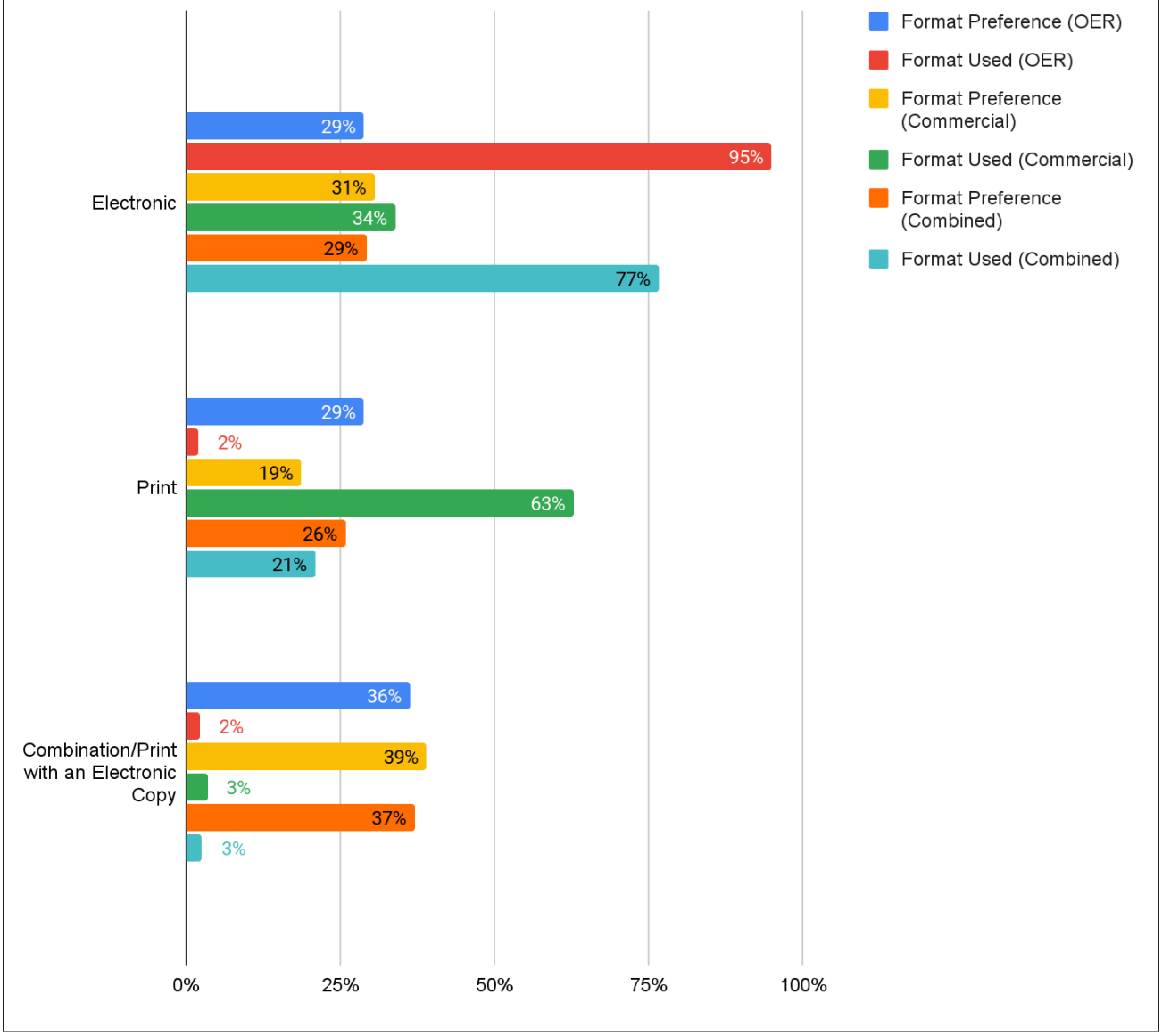
Students were also asked which format they actually used for their textbook for the course: print, electronic, or some combination of the two (i.e., printed pages of an electronic book). Results indicated that there was a gap between what students expressed that they wanted in terms of format and what they actually used. Although print with an electronic copy was the most common preference, the most common format used—77 percent—was electronic only (150). At 21 percent (41), print only was the second most popular option. Only 3 percent (five) of students actually used a combination of print and electronic copies.

In addition, students displayed different usage patterns based upon whether they were using an OER or a commercial textbook (Figure 2). A majority—63 percent—of students using a commercial textbook (37) used a print textbook, while 95 percent (130) of students using an OER used an electronic copy only. Only 2 percent (four) students who had an OER textbook reported using the textbook both electronically and in print, although they had the option to print it out.

Discussion

Study results indicated that first-generation students demonstrated significant differences from continuing-generation students in two key areas: 1. financial concerns and 2. aspects of textbooks they consider important. In addition, overall findings suggest that students need

FIGURE 2
Students in Commercial and OER Sections and their Textbook Format Preferences and Formats Used



more information about the availability of OER textbook options and how to access OER textbooks in their preferred textbook format.

Financial Concerns

This study reinforces research that indicates a substantial number of university students experience textbook-related financial barriers[18] and food insecurity.[19] A majority, fifty-seven percent (117) of respondents indicated that they had experienced concern about the cost of textbooks somewhat often or very often. Similarly, the cost of a college education weighs heavily on students' minds. Sixty-two percent (128) reported feeling concern about the cost of college somewhat often or very often. Almost half, 44 percent (91), reported needing to work to pay for their college education somewhat often or very often. A smaller, though still dismaying,

percentage of respondents, 26 percent (54), reported concern about access to meals since the beginning of the semester.

Furthermore, cost barriers are experienced more frequently by some student populations, and OER adoption can benefit those students more than others. For instance, research indicates that OER adoption can disproportionately benefit underserved student populations, such as Pell-eligible students.[20] This study revealed that students who identified as first-generation students were significantly more likely to indicate that they experienced concern about financial barriers than their continuing-generation peers. As Texas A&M strives to make higher education more equitable for underserved populations, OER should be recognized as one strategy that can help reduce cost barriers.

Important Aspects of Textbooks

This study also revealed what students found important about their textbooks. Seventy-seven percent of students (157) considered it either very important or extremely important that their textbook be comprehensive, meaning that everything was gathered in one place. The researchers interpret this finding to mean that students find ease of access an important factor; students may dislike having to look through multiple resources to find the information they need. This finding was particularly noteworthy because the commercial textbooks previously used in the class were a three-textbook package, which meant that students had to keep track of which book to bring on any given day. Additionally, this suggests that when OER authors and adaptors are compiling readings it will benefit students to gather those materials into one collection or textbook. Rather than accessing multiple links through different portals, students perceive a benefit to joining all of those materials together.

The other aspect of textbooks that students found very important, at 31 percent (64) or extremely important, at 38 percent (78) was cost. Cost was particularly important for first-generation students. Fifty-nine percent (36) of first-generation students considered cost to be an extremely important factor, compared to twenty-nine percent (42) of continuing-generation students. Strikingly, not a single first-generation student considered cost to be unimportant.

This finding reinforces that, while not all students are sensitive to textbook costs, many first-generation students are likely to consider price to be a critical factor in choosing a textbook. Faculty should consider that first-generation students in their classes may have an expectation that faculty will be price-sensitive when assigning materials. Likewise, universities may wish to place additional emphasis on textbook affordability initiatives when developing first-generation student success programs.

Awareness of OER

First-generation students, along with other financially disadvantaged students, may be particularly likely to benefit from a change to OER course materials. But in order for that benefit to be realized, students must be empowered to act as informed consumers, using information about prospective textbook costs to guide their course registration choices. The results from this study indicate that students are not able to effectively use information about textbook costs even when an OER course marking system is in place during registration.

Although the OER sections of ENGL 104 were tagged in the University's course marking system, a mere 2.9 percent of students (four) reported being aware that their course was an OER course when they registered. By contrast, 96% percent (131 students) reported learning

that the textbook was available at no cost when classes were already starting (i.e., on the first day or when they received their syllabus). This delay in learning about textbook costs means that students who could most benefit from a no-cost textbook were unable to strategically select an OER section. Receiving the financial relief of an OER textbook was effectively luck of the draw. This finding indicates that course marking alone is not sufficient to ensure that students can act as informed consumers. Instead, instructors and librarians should work to improve awareness of OER in course sections, working with administrators, academic advisors, and other campus stakeholders to ensure that messaging about OER courses is being communicated effectively to students. Additionally, for universities where students are registered into courses by academic advisors, additional outreach to that advising group may be necessary for increased awareness and impact.

Textbook Preferences

Another important finding is that the primary method by which students accessed their OER textbook, electronic only access, does not align with the access method students stated they preferred. Respondents indicated that they wanted textbooks that they could highlight and make notes in; they wanted a textbook that they could hold in their hands and that didn't strain their eyes. At the same time, respondents wanted textbooks that they could access from anywhere and that had searchable text. Finally, respondents strongly indicated a desire for a textbook that is not unwieldy and heavy to lug across campus. Print with an electronic copy, the format most popular with students, meets all of these criteria.

OER textbooks are ideally suited for the print with an electronic copy format. Although OER textbooks are most cost-effective in an online-only format, their licensing is typically far more permissible than commercial electronic textbook or ebook format, which may prohibit printing or restrict the number of pages that can be printed. While few students took advantage of the option, the ENGL 104 OER textbook is licensed such that students could print pages, sections, or the entire textbook.

In order to emphasize the flexibility of the OER textbook, librarians and course instructors may choose to discuss printing options when introducing the textbook. Promoting a print option may reduce resistance to an OER by students who learn better from, or simply prefer, a print textbook. Course instructors and librarians can work together to make it easier for students to identify and access available printing options, both on campus and online, to meet the needs of students who prefer print.

Additionally, study results support the common-sense notion that students who prefer print options do so for a variety of reasons. Many respondents indicated that they learn better from a print version, or that they benefit from being able to highlight and annotate as they read their textbooks. Having a print option available may be necessary to meet accessibility requirements. In addition to facilitating print options, faculty and librarians working to adopt, adapt, or create OER should take into account student interests in these types of learning tools. OER creators can support these needs by building in highlighting and annotating tools, or even by providing an editable version that students can highlight and annotate in word processing software. For students who want or need a printed textbook, OER creators can ensure that they include print-friendly downloadable files at OER electronic access points.

Limitations

This study has several limitations. This survey was distributed to students enrolled in one course for a single semester; the researchers initially intended to collect a larger data set by surveying students over the course of two semesters, but data collection for the Spring 2020 semester was canceled due to the COVID-19 pandemic. Furthermore, data was collected at a single institution using a convenience sample, and its results cannot be generalized to other institutions. Finally, this study is based on perception data, which may not correlate with student behavior.

Conclusion

As libraries commit to supporting OER adoptions and creation, it is important to continually assess student perceptions of OER. The college student experience is in flux as schools employ new technologies and the college cost models are continually reviewed and modified. Furthermore, the ramifications of COVID-19 and the momentum towards open publishing in general will continue to affect students for years to come. Considering this continual upheaval, libraries promoting OER, whether by supporting faculty through guidance and funding or by taking a more active role in the creation process, should regularly survey students and faculty to see what will be most beneficial for future iterations.

When considering the potential impact of OER on students, librarians and faculty should consider the specific impact on underserved populations such as first-generation students. Even on a relatively affluent campus, there are many students for whom the cost of textbooks is a significant burden. Switching to an OER textbook can be a key strategy toward ensuring equitable access to course materials for students who are financially disadvantaged. But making OER available is only the first step. Ensuring that underserved students know about OER courses and can enroll in these OER classes is key to maximizing the potential of OER. Furthermore, ensuring that students can access OER textbooks in a format that suits their learning needs will help ensure that students receive a more equitable experience.

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Informing Algorithmic Literacy Through User Folk Theories

Michael Ridley

As part of a broader information literacy agenda, academic libraries are interested in advancing algorithmic literacy. Folk theories of algorithmic decision-making systems, such as recommender systems, can provide insights into designing and delivering enhanced algorithmic literacy initiatives. Users of the Spotify music recommendation systems were surveyed and interviewed to elicit their folk theories about how music recommendations are made. Seven folk theories emerged from this study and are grouped into four themes: agency, context, trust, and feelings. These four themes are used to illustrate how folk theories can inform algorithmic literacy programming and curricula.

Introduction

Folk theories of algorithmic decision-making systems tell us what people believe about how these systems work and how users should interact with them. Consumer-facing recommender systems using advanced machine learning techniques—such as Amazon, Facebook, and TikTok—are the "public face" of artificial intelligence. Equally ubiquitous are academic tools and resources using machine learning that are now essential for scholarship across all disciplines.

These systems underscore that "our entanglement with algorithmic personalization is non-negotiable: it is a market driven pre-condition of the digital everyday" (Kant, 2020, p. 214). Despite their ubiquity in the digital marketplace, most people continue to have concerns about their use and influence (Bao et al., 2022; Pew Research Center, 2018; Sartori & Bocca, 2022). The insights provided by folk theories can be used to focus and enhance strategies towards algorithmic literacy, enabling users to mitigate harm and risk while advancing the effective and productive use of these systems. The results presented here are part of a larger study of the folk theories of the Spotify music recommendation system as well as how those theories could facilitate the development of more transparent and explainable recommender systems (Ridley, 2022). A key question in that research was the relationship between folk theories and algorithmic literacy. Can folk theories inform algorithmic literacy?

Our lives are now "algorithmically mediated" (Anderson, 2020). Students, staff, and faculty encounter tools and services that rely on machine learning in virtually all aspects of their academic and personal lives. However, "the danger is not so much in delegating cogni-

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tive tasks, but in distancing ourselves from–or in not knowing about–the nature and precise mechanisms of that delegation" (de Mul & van den Berg, 2011, p. 59). The pervasiveness of algorithms highlights "issues of social justice, inequality, and social exclusion, which left unexamined, can result in positions of precarity and information poverty. Herein lies a role for information literacy, which in turn provides the warrant for the interest of librarians and educators" (Lloyd, 2019, p. 1480). Southworth et al. position the challenge of algorithmic literacy in the specific context of higher education curriculum with libraries and librarians as key participants (2023). In response, academic libraries are beginning to play key roles in advancing algorithmic literacy (Ridley & Pawlick-Potts, 2021) with relevant learning initiatives already in place or emerging (Gasparini & Kautonen, 2022; Hervieux & Wheatley, 2022; Kim, 2019; Upshall, 2022; Weintrop et al., 2021). However, the gap between what users believe about algorithms (i.e., their folk theories) and how to use algorithmic systems effectively remains an area that is both problematic in terms of user understanding and fruitful in terms of pedagogical strategies.

Literature Review

What is Algorithmic Literacy?

While algorithmic literacy is related to information literacy and other "digital" literacies such as computational literacy and data literacy, it also represents a unique area of interest that requires its own attention. As this is an emerging area, multiple definitions are presented. Finn defines algorithmic literacy as a capacity "that builds from a basic understanding of computational systems, their potential and their limitations, to offer us intellectual tools for interpreting the algorithms shaping and producing knowledge" (2017a, p. 25). It provides "a way to contend with both the inherent complexity of computation and the ambiguity that ensues when that complexity intersects with human culture" (Finn, 2017b, p. 2). A more operational definition views algorithmic literacy as "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (Long & Magerko, 2020, p. 27). Ridley and Pawlick-Potts provide an action-oriented, pedagogically informed definition:

> Algorithmic literacy is the skill, expertise, and awareness to
> - Understand and reason about algorithms and their processes,
> - Recognize and interpret their use in systems (whether embedded or overt),
> - Create and apply algorithmic techniques and tools to problems in a variety of domains,
> - Assess the influence and effect of algorithms in social, cultural, economic, and political contexts, and
> - Position the individual as a co-constituent in algorithmic decision making (Ridley & Pawlick-Potts, 2021, p. 4).

The importance of algorithmic literacy to academic libraries specifically and the academy more generally is documented in the recent Project Information Literacy report on student attitudes towards algorithmic systems. It found that: students have "ambivalent attitudes" towards algorithmic systems; they use "defensive strategies" to protect their privacy; trust in these systems is "dead"; and that "skepticism lives." The report's conclusion is that, "the age of algorithms demands that teaching strategies be reconsidered as we redefine information literacy" (Head et al., 2020, p. 28).

What are Folk Theories?

Folk theories, also known as mental models, are "the mental representations that humans use to structure experience" (Gelman & Legare, 2011, p. 380). They allow people to "systematically investigate what [they] believe to be true about particular domains" (Payne, 2003, p. 152). Folk theories are "surprisingly meager, imprecisely specified, and full of inconsistencies, gaps, and idiosyncratic quirks" (Norman, 1983, p. 8) and yet they are also "causal and explanatory" (Gelman & Legare, 2011, p. 380). Crucial to using folk theories as insights into algorithmic literacy is the understanding that they are "not neutral or passive snapshots of experience; they embody cognitive biases that influence thought and action" (Gelman & Legare, 2011, p. 380). In the context of algorithmic systems, Bucher calls folk theories the "algorithmic imaginary" explaining, "the algorithmic imaginary is not to be understood as a false belief or fetish of sorts but, rather, as the way in which people imagine, perceive and experience algorithms and what these imaginations make possible" (2017, p. 31).

This study builds on prior research that investigates the folk theories of algorithmic systems (French & Hancock, 2017; Martens et al., 2022; Siles et al., 2020; Ytre-Arne & Moe, 2021). Uniquely, this study applies elicited folk theories as insights into how algorithmic literacy can be advanced.

Methodology

Nineteen users of Spotify, recruited using Twitter, were surveyed and individually interviewed to elicit their folk theories about how the system makes personalized music recommendations. All the participants were 18+ years old and from Canada or the United States. Participants were drawn from the general population, not specific groups (e.g., faculty or students). This was done purposefully to not only capture the zeitgeist of the emerging era of algorithms but to recognize that academic libraries serve broad and diverse communities both from within and beyond academia. Spotify was selected as a representative recommender system because of its size, reach, experience, and relative transparency about its algorithms. Available in 184 countries, Spotify has ~400 million monthly users offering over 82 million songs and ~4 billion playlists (Spotify, 2021). Spotify uses a variety of machine learning algorithms including simple heuristics, matrix factorization and collaborative filtering, and state-of-the-art deep learning neural networks and reinforcement learning (Eriksson et al., 2019; Stål, 2021; Whitman, 2012). Machine learning is "the heart of everything we do at Spotify" (Jebara, 2020). Spotify was also selected because of its broad appeal to and use by faculty, students, and staff.

Survey Results

A statistical analysis and factor analysis were conducted on the online Qualtrics survey to determine key background data and beliefs central to Spotify as an algorithmic system (see Appendix A for the Spotify User Survey). Most participants described themselves as "passionate" or "keen" about music. They were avid Spotify users, with most listening every day or most days. Many of the participants had used the system for over five years. Most participants (81%) were satisfied with the recommendations they receive from Spotify. One of the key questions asked participants how they believed Spotify makes its personalized recommendations. The five options—with results in parentheses—are: solely by algorithms (57.9%), primarily by algorithms and partly by humans (36.8%), primarily by humans and partly by algorithms (0%), solely by humans (0%), and don't know (5.3%). In fact, Spotify makes its

recommendations primarily by algorithms and partly by humans (Fleischer & Snickars, 2017; Goldschmitt & Seaver, 2019; Pichl et al., 2017; Popper, 2015) indicating that most participants hold an incorrect belief about how Spotify works. The results also indicate that all participants prioritize the role of algorithms over humans whether solely or primarily.

Another key question asked participants to rate the influence of 22 different factors that Spotify uses in its music recommendation process. The most common responses identified a similar cluster of actions: what users were listening to (i.e., songs, artists, and genres), frequency of listening, skipping songs, "liking" (i.e., "hearting") songs or playlists, creating playlists, and adding songs to their library. The following categories were all rated "very important" by participants: "What I listen to" (95%), "How many times I listen" (89%), and "Marking something a 'like' (i.e., 'heart') (68%). Factors representing explicit actions by participants were consistently rated more highly than the actions of other users and inferences made by the system. See Appendix A for a complete list of the items rated. These findings were used to inform the subsequent interviews.

Interviews

The interviews, conducted over Zoom, recorded, and lasting approximately 60 minutes, were thematically analyzed using NVivo. Thematic analysis attempts "to identify or examine the *underlying* ideas, assumptions, and conceptualizations—and ideologies—that are theorized as shaping or informing the semantic content of the data" (Braun & Clarke, 2006, p. 84). Individual and collective responses from the survey formed the basis of the initial questions posed during the interviews. To focus participant responses on the effect of algorithms, follow-up questions directly or indirectly referenced the three key machine learning functions: representation, evaluation, and optimization (Domingos, 2015). Moving from the general to the specific, questioning sought a deeper understanding of concepts raised by the participant. Counterfactual or contrastive questions broadened the conversation by probing areas unexplored by the participant.

Limitations

This study has several limitations which restrict the generalizability of the findings. The sample size is small and not random. As such, it is not necessarily representative of Spotify users. Selecting Spotify as the single example of recommender systems allowed for specific details and experiences to emerge from users. However, investigating multiple systems might have resulted in a broader set of folk theories that would be more generalizable. Finally, the research methodology used to elicit the folk theories has known weaknesses (Doherty & Doherty, 2018; Norman, 1983). Surveys and interviews rely on reflective experience which may not correlate to actual experience.

Findings and Discussion

The analysis of the survey and interviews elicited seven folk theories. They are grouped here by themes and expressed as verbs (i.e., "Spotify Complies," "Spotify Decides"):

Agency: Compiles, Decides, Dialogues
Context: Surveils, Exploits
Trust: Withholds & Conceals
Feeling: Empathizes

It is important to remember that individual users will hold some but not all these folk theories and some users may hold contradictory beliefs depending on the context.

Agency: Spotify Complies, Decides, and Dialogues

Some users believe Spotify "Complies" based on the users' specific directions and actions; for example, User 3 stated, "The only cues that it's getting are the ones that I'm feeding it." In this view, the user is in control and the algorithm responds to their signals (e.g., what they listen to, how many times they listen, what songs they "like" or include in personal playlists). The factor analysis revealed overwhelmingly that the algorithm is viewed as "about me." User 19 was clear about user agency explaining, "Spotify only works because they [listeners] are teaching it to work."

The folk theory that Spotify "Decides" places agency solely with the algorithm. Spotify's recommendations are made based on its own objectives and not that of users. For some users, this is acceptable. They put Spotify "on cruise control" and let the system "take the wheel" (User 5). For others, this is problematic: Spotify "silos me into a particular style" (User 16) and when "in doubt" Spotify will "give me the thing they're being paid to promote" (User 18). With sole algorithmic agency, users believe they have no control. As User 13 said, "It's all this giant black box, I don't know anything and there's nothing I can do about it either."

The Spotify "Dialogues" folk theory is about shared agency where the user and the algorithm are in a cooperative relationship. As User 19 describes it as: "I'm feeding it, it feeds me." In this belief, Spotify is a "feedback loop" (User 16). Users believe the algorithm does "a good job of matching my music tastes" (User 12) and is "good at anticipating what kind of music I would be into" (User 14). Some users perceive the dialogue with the algorithm is insufficient, they want a more informed exchange, such as User 10 who said, "Give me a bigger vocabulary and then make it meaningful. Then prove to me that you've heard me."

Context: Spotify Surveils and Exploits

The two folk theories, Spotify "Surveils" and Spotify "Exploits," reflect beliefs that are both negative and positive indicating that perceptions are contextual. While User 2 said "I don't like that they're collecting data … I don't like that they know so much about me" (User 2), users also understand that data tracking and capture (sometimes experienced as surveillance) is part of the "surrender of personal information that it needs in order to make recommendations that you want. I think that's part of the deal" (User 20). Similarly, the belief that Spotify "Exploits," reflected in the observation "my choices, my preferences, are being harvested for their algorithm … [and this is] the product people are paying for" (User 15), is tempered by the perception that this a necessary part of the "bargain" to ensure satisfactory recommendations (User 3). Important here is the recognition that some folk theories contain apparent contradictions unless the specific context and the use case are understood.

Trust: Spotify Withholds and Conceals

The folk theory Spotify "Withholds and Conceals" reflects a breakdown in trust. Spotify is "a complete black box" (User 3) where users are "not exactly fully cooperating here because Spotify is still doing a lot that we don't necessarily know" (User 13). As a result, users believe Spotify limits the effect of their actions since none "seem to influence algorithms too much"

(User 20). Users perceive Spotify as operating "behind the curtain" (User 11) deliberately beyond their scrutiny and influence.

Feeling: Empathizes

While the personification or anthropomorphization of information systems is common, Spotify users had a more specific belief: Spotify "Empathizes." In the survey, the importance of "what I'm feeling while I'm listening" as a data signal that influences the recommendations the Spotify algorithm provides was rated "very important" or "important" by 32% of the participants. User 14 believes Spotify infers user feelings to make recommendations ("Yeah, I think so") and another user, although skeptical, "wouldn't be surprised if I'm wrong" (User 11). Whether, and if so how, algorithmic systems infer and use emotional states is highly controversial (Crawford, 2021; Stark & Hoey, 2021) The "Empathizes" folk theory indicates that, debates and critics aside, this perception is part of many user experiences.

Folk Theories and Algorithmic Literacy Programming and Curricula

The themes arising from the folk theories (agency, context, trust, and feeling) illustrate how folk theories can be utilized to enhance algorithmic literacy programming and curricula.

Agency

The diverse folk theories about agency (Complies, Decides, Dialogues) suggests that this is a key issue in leveraging folk theories to enhance algorithmic literacy. A 2016 study of the folk theories of Facebook's News Feed found two surprising results regarding agency (Eslami et al., 2016). First, at the beginning of the study, 62% of the participants were unaware that any algorithm at all was involved and believed the user was in full control. Second, even following interventions that described the algorithm and how it worked, 12% of the participants believed the News Feed was completely random and that there was no control.

In fact, recommender systems are built on shared agency ("I'm feeding it, it feeds me"), although the balance of power can vary greatly from one algorithmic system to another. As Lomborg & Kapsch note, "while algorithms do things to people, people also do things to algorithms" (2020, p. 755). While acquiescing to the system by letting it "take the wheel" is a user choice (a form of Spotify "Decides"), it can obscure that a user's behaviour, whether conscious or not, always influences the recommendations of the algorithm.

Users should be encouraged and supported to explore the range of their agency. What tools and choices are available to influence the algorithms? What impact do they have (if any)? Can the user recognize when system or user objectives are prioritized?

Spotify "Decides," or even aspects of Spotify "Dialogues," can lead to explorations of resistance that can ameliorate user concerns while still benefiting from using the system. This is a form of contested agency where the user deliberately attempts to "confound" the algorithm (User 4) to exert greater influence. In a similar manner User 10, in requesting a "better vocabulary," was asking for a rebalancing of the shared agency. Discussing and exploring agency promotes user empowerment regarding algorithmic systems. Learning strategies that emphasize shared agency open a dialogue about an issue central to algorithmic literacy.

Context

Context matters in all human-machine interactions. However, in the case of the folk theories,

Spotify "Surveils" and Spotify "Exploits," context highlights a key dilemma. Surveillance, which can be described as the tracking and collecting as much user data as possible or allowable, and exploitation, which can be described as the sharing one user's data to enhance the recommendations of another user, are core processes of any recommender system. Surveillance and exploitation are perceived through two different but simultaneously occurring lenses. These perceptions reflect conditions that are undesirable and unwanted but also necessary and an accepted part of the "bargain." The conditions of a recommender system make both possible and both necessary.

Algorithmic literacy recognizes surveillance and exploitation as perceptions best treated as a continuums not as unconditional problems or an either/or choice. The context of these beliefs is critical in discussing how to minimize risks while maximizing the value of the system.

Trust

The Spotify "Withholds and Conceals" folk theory is a belief that the algorithmic system is not fully forthcoming about its operations and motivations. In this belief, the system is not merely opaque (i.e., a "black box" because of the complexities of machine learning) it is deliberately so to preserve the "curtain" that hides the system from scrutiny (Pasquale, 2015).

While establishing trust is important for the effective use of any system, unwarranted trust can limit critical engagement and assessment and lead to acceptance of malicious and deceptive practices (Pawlick-Potts, 2022). In that sense, Spotify "Withholds and Conceals" is a belief that maintains a skeptical and a critical stance.

Recommender systems often are secretive or unforthcoming to protect intellectual property, trade secrets, or other competitive advantages. This folk theory opens a discussion about the limits of transparency, the rights and obligations of users and corporate entities, the role of consumer protection, and the possibility of government regulation in this area.

Feeling

While critics are concerned that user personification or anthropomorphization of algorithmic systems harm critical appraisal and trustworthiness (Glikson & Woolley, 2020; Ngo & Krämer, 2021; Watson, 2019), users do it anyway. Spotify "Empathizes" is a belief that the algorithm understands a user's emotional state and responds accordingly. While Spotify insists that it does not collect or infer emotions (Gutierrez, 2021), users believe otherwise.

It seems unlikely that algorithmic systems will discourage this form of bonding and that users will not continue to form such bonds. As a result, a key question is what constitutes a healthy relationship with an algorithmic system? While this obviously starts with the recognition that a system is not a person, systems are social actors and need to be understood in that context (Nass et al., 1997).

Enhancing Algorithmic Literacy

DeVito classifies the complexity of folk theories regarding algorithms as a hierarchy moving from basic awareness and causal effects (characteristics of DeVito's functional theories) to the identification of "mechanistic fragments" (e.g., factors or data signals) and finally to the aggregation of these factors into more complex interrelationships indicating "mechanistic ordering" (both latter are characteristics of DeVito's structural theories) (2021).

Moving users from functional to structural theories is the objective of algorithmic literacy (DeVito, 2021). However, "knowledge itself does not seem to prompt more critical engagement

with and valuation of algorithms" (Lomborg & Kapsch, 2020, p. 757). Although the folk theories discussed above are primarily conceptual, the recommended approach to algorithmic literacy is not through theoretical methods but through "real life examples of algorithmic work in different contexts, relatable to the life of ordinary people" (Lomborg & Kapsch, 2020, p. 759). Understanding the way some of the multiple data elements combine and interact (i.e., "the mechanistic ordering" of "fragments") is sufficient to trigger the transition in theories. The deeper conceptual issues, important aspects characteristic of structural theories, can be layered on as personal experiences (i.e., a user's folk theories) are explored and perhaps challenged.

In offering a set of principles for algorithmic literacy training, Dasgupta and Hill include "respect community values about technology that may differ" (2020, p. 1-2). This is an important observation for academic libraries given the diverse community they engage with. In this context, "communities" might be students or faculty, humanists or scientists, and technology experts or technology neophytes. Groups and individuals will bring to algorithmic literacy programming or curricula their own perspectives about technology, a point central to the idea of understanding folk theories.

Conclusion

Calling the prevalence and opacity of algorithms "a wicked problem for librarians and archivists" engaged in information literacy, Lloyd situates algorithmic literacy in a sociotechnical context that highlights the co-constituency of people and technology (2019). Folk theories form a bridge that allows us to "meet the user where they are in terms of understanding and literacy, regardless of how contradictory, sparse, or fragmented these understandings may be" (DeVito, 2021, p. 4). They tell us not only how users perceive algorithmic systems but also how they believe they should interact with them. As algorithmic literacy becomes increasingly important for the effective use of research and discovery tools and services fueled by machine learning, academic libraries are well positioned to provide leadership through relevant programming and curricula. Applying the insights of folk theories about algorithms can enhance those algorithm literacy initiatives.

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Appendix A: Spotify User Survey

Which of the following best describes your interest in music?

- □ Passionate about music with extensive knowledge
- □ Keen about music but balanced with other interests
- □ Music is important but other things are far more important
- □ Engage with music but are generally indifferent

Would you describe yourself as a "specialist" (listens to mostly the same artists and genres) or "generalist" (listens to a wide variety of artists and genres)?

- □ Specialist
- □ Generalist

Do you subscribe to Spotify (pay version) or use the free (ad-supported) version?

- □ Paid (subscription) version
- □ Free (ad-supported) version

How long have you been using Spotify?

- □ Less than 1 year
- □ 1 to 5 years
- □ More than 5 years

How often do you listen to Spotify?

- □ Every day
- □ Most days
- □ At least weekly
- □ Less often than weekly

How do you primarily listen to Spotify?

- □ On a laptop or desktop computer
- □ On a smartphone or mobile device?
- □ On a smart assistant (e.g., Alexa, Google Home)
- □ Other

Are you generally satisfied with Spotify's personalized music recommendations to you?

- □ Yes
- □ No

How do you think Spotify's personalized music recommendations are made?

- □ Solely by algorithms
- □ Primarily by algorithms and partly by humans
- □ Primarily by humans and partly by algorithms
- □ Solely by humans
- □ Don't Know

How does Spotify use information to determine the personalized music recommendations for you?

[Open ended question]

What could you do to shape the personalized music recommendations you receive from Spotify?

[Open ended question]

To what extent do you think the following influence Spotify's music recommendations for you?

(very important=1; important=2, somewhat important=3; not important=4)

_____ Marking something a "like" (i.e., "heart") What I listen to
_____ How long I listen to a song or playlist
_____ How many times I listen to a song, artist or playlist
_____ What other people are listening to
_____ What my friends are listening to
_____ Songs that are similar to other songs I "liked" or listened to
_____ Playlists I've created
_____ Playlists other users have created
_____ What people my age listen to
_____ What people in my location (city/country) listen to
_____ What people with my level of education listen to
_____ Where I am while listening
_____ What I'm doing while listening
_____ What I'm feeling while listening
_____ The time of day I'm listening
_____ The day of the week I'm listening
_____ The season of the year I'm listening
_____ Songs or artists that Spotify is promoting
_____ Posts about Spotify I make on social media
_____ Comments from other people about music on social media
_____ Reviews of music in magazines, blogs, videos, news sources

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Training Needs and Preferences for Librarians Supporting Systematic Reviews in the Sciences, Humanities, and Social Sciences

Mê-Linh Lê, Janice Winkler, and Christine J. Neilson

Systematic reviews, and other forms of knowledge synthesis, are an increasingly popular research methodology being used in the sciences, humanities, and social sciences. Librarians are being called upon to support this work through consultation, instruction, and/or performing the systematic search on behalf of the research team. Professional development is essential for librarians to develop their skills and to build confidence when it comes to providing SR support to researchers. This article reports on a survey of American and Canadian academic librarians serving the Sciences, Humanities and Social Sciences. Participants' responses indicate their knowledge of SR support activities and identify potential areas to focus on for future training and professional development.

Background

Knowledge synthesis (KS) reviews, or evidence syntheses, are popular forms of research that systematically gather, evaluate, and synthesize existing literature to answer a research question. While systematic reviews may be the most well-known form of KS, the types of reviews included in the KS "family" continues to expand, and includes scoping reviews, meta-ethnographies, and integrative reviews, among many others. The specific type of KS review used by a research team will vary based on several factors, such as the type of question being asked (e.g., narrow or more broad focused), the types of studies to include (e.g., quantitative, qualitative, mixed-methods, etc.), or amount of time available. Systematic reviews are traditionally very focused questions that include specific study types to compare interventions. Scoping reviews typically ask broader questions that are exploratory in nature and can help to identify gaps in the literature or areas needing more specific focus. Meta-ethnographies, which are considered a form of qualitative systematic review, attempt to provide new interpretations or theories to explain what the research is showing, rather than simply collecting all known evidence on a topic. Integrative reviews summarize existing theoretical or empirical evidence to give a broader understanding of a phenomenon or practice across multiple disciplines and can include a wide array of methodologies.[1] These four review types can all take anywhere from six

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months to years but there are reviews that can be done in shorter time periods as well (e.g., rapid reviews). There are now over forty different types of KS reviews, each suitable for different purposes and contexts.[2] For the purposes of simplicity, all forms of KS will be referred to as Systematic Reviews (SR) hereafter.

As SRs are literature-based research, supporting SR researchers is a natural role for the library. Health librarians have filled this role for many years, to the extent that growing demand for health librarian involvement has led to concerns over librarian workload, and publications with titles such as "What to Do When Everyone Wants You to Collaborate: Managing the Demand for Library Support in Systematic Review Searching" and "Burnout Among Medical and Health Sciences Information Professionals Who Support Systematic Reviews: An Exploratory Study."[3] But health is not the only field that uses SR methods. Shelbe established a history of the use of SR methods in a variety of disciplines through a bibliometric study of scholarly publication spanning 1972-2011.[4] SRs were established in education, psychology, and business in the 1970s, and were later adopted in various other fields at varying rates. The number of SRs published increased over time in all the fields examined; however, the health/medicine disciplines produced the most SRs during the nearly forty year period examined—with an average of 209.4 SRs per 10,000 articles published—because publications in the field included the continuous use of SR methods. The science disciplines had an average of 66.1 SRs per 10,000 publications, and social science disciplines followed closely with an average of 56.4 SRs per 10,000 publications during the time period examined.[5] A thorough inventory of SRs published in various disciplinary areas after 2011 is not available; however, even if the use of SR methods stopped growing and remained constant since then, the number of SRs published per year will have increased over the past twelve years as the number of scholarly articles overall has increased. A recent study by Savage and Olejniczak estimates that the number of articles published by American social scientists increased by over 36 percent between 2011 and 2019, while the number of books published dropped by over 23 percent during the same period.[6] Meanwhile White reported that worldwide, the number of peer reviewed publications in the Sciences—including health—increased from 1.9 million publications published in the year 2010 to 2.9 million published in the year 2020.[7]

With more and more SRs being published, library discourse has begun to take a closer look at SRs completed in the Sciences, Humanities, and Social Sciences (SHSS), and the library's role in supporting SRs in those disciplines. This includes the examinations of the characteristics of SHSS SRs;[8] documented librarian involvement in SHSS SRs;[9] resources and techniques for conducting SRs outside of health;[10] descriptions of developing SR support services beyond health;[11] and the benefits of library support for SHSS SRs.[12] Of particular relevance to this paper, Kogut and colleagues' 2020 case study documented a program to develop SR expertise among education liaison librarians in order to meet the growing demand for SR support from the Texas A&M University's College of Education and Human Development.[13] Demand for SR support in Education may not come as a surprise given the long history of SR method use in the field, but in a complementary article, we found that demand for SR support has increased in SHSS broadly. We reported that 70 percent of survey respondents indicated that a faculty member, researcher, or student from the SHSS had asked them to participate in a systematic review in the past five years, and 55.9 percent of respondents indicated an increase in the frequency of those requests during that time.[14] Some respondents were responsible for liaison to a health discipline as well as a SHSS discipline, but requests for support were not

attributed to health alone; 1.7 percent of SR support requests were attributed to the Humanities, 18 percent of requests came from the Sciences, and 39.3 percent of support requests came out of the Social Sciences.

As library support services for SRs outside of health start to grow, so too does the need for training librarians to provide that support. Professional learning can take place in many forms: in person, virtually, or independently. Examples include professional reading; learning from colleagues through mentorship[15] or communities of practice; learning through experience; attending workshops and courses;[16] or combinations of the above.[17] Townsend and colleagues developed a set of six competency areas for health librarians that may prove useful to librarians serving other disciplines when creating a plan for continuing education. These six areas are: SR foundations; process management and communication; research methodology; comprehensive searching; data management; and reporting.[18] While Townsend and colleagues' competency framework provides a starting point, Kogut and colleagues have pointed out three key elements that lead to the success of their SR training program for Education librarians: 1. Training must be tailored to the librarians' liaison area, as the health context will not necessarily translate to other disciplines; 2. Experienced subject librarians possess existing disciplinary knowledge and skills that are important for SR support, but it is important to recognize that even with that head start, becoming proficient in SR support is a process that will take years; 3. Making SR support one of library administration's service priorities is necessary to ensure that librarians take the time needed to actively develop their knowledge and skills in that area.[19]

If SR training for SHSS librarians is needed, what should that training look like? This article reports on the systematic review training needs and preferences for librarians who support subject areas in the SHSS disciplines. This data was collected as part of a survey of Association of Research Libraries (ARL) and Canadian Association of Research Libraries (CARL) SHSS librarians' involvement in SRs, their comfort and competence with systematic review processes, and their perception of library administrators' level of support for SHSS librarian participation in systematic reviews. Information regarding the demand for SR support and librarian involvement are presented in a separate article.[20]

Methods

This paper reports additional analysis of a previously reported survey.[21] A complete account of the study methods are available there and are summarized for the reader here. This study was approved by the authors' institutional research ethics board (JFREB J2020:062). Librarians who support subject areas in the sciences, humanities, and social sciences (SHSS) at ARL and CARL institutions were surveyed with an open online survey. Participants were recruited in a convenience sample using twenty-two major listservs with an initial recruitment email and a reminder email three weeks later. Librarians were invited to participate if they were currently employed at an ARL or CARL institution, providing direct library services and support to faculty, staff, or students within the sciences, humanities, or social sciences.

In the survey, respondents were asked which disciplines they support, as well as which disciplines have requested SR support, and for the purposes of analysis these responses were grouped into broader categories of Humanities, Sciences, Social Sciences, and Health Sciences. Each discipline only fell under one category, though respondents often support disciplines in more than one category. The method used for grouping disciplinary areas is discussed in more

detail in Lê, Neilson, and Winkler,[22] and a list of liaison areas which fell under each category is available via Open Science Framework (OSF) at https://osf.io/mqxf2/.[23]

During data clean-up, responses were removed from the survey if they did not meet the stated inclusion criteria. Namely, respondents had to be librarians working at a CARL/ARL institution who supported at least one discipline within the SHSS. Respondents were removed if after categorization it was determined that they only supported health sciences disciplines, or if they provided their institution and it was found not to be a CARL/ARL institution. Responses were also removed if respondents did not complete the survey beyond the initial demographic questions. A total of 379 participants responded (360 in English, and nineteen in French). After responses were removed that did not meet the stated inclusion criteria, 161 usable responses remained. The largest number of excluded responses (n=156) were from librarians that did not work at a CARL/ARL institution.

The survey contained a total of twenty-nine possible questions; conditional logic ensured that respondents were only asked questions which were applicable to them. All questions were optional, so that participants were able to skip any question to which they did not wish to provide an answer. A subset of ten questions in the survey asked about their training opportunities and preferences; these responses are reported here. The survey asked what SR related training they had received, and whether they received support from their library administrators in the form of funding for fees (e.g., professional development registration fees for SR training) or time to complete the training. It also asked their preferred format for training and if they had anyone to whom they could ask questions about SR methods.

In order to assess training needs, respondents were asked to indicate their knowledge of several standard areas of SR support. They were then asked about their confidence in supporting patrons in these areas: the review process, and what makes different types of reviews unique; different forms of bias and how to mitigate them in the literature search; established tools and published guidelines for systematic reviews; translating search strategies for use in other databases; searching the grey literature; requirements for record keeping and literature search reporting; using reference management software for de-duplication of large result sets; and using screening software designed for use in systematic reviews. Because database searching is a core skill in librarianship, respondents were not asked about their level of knowledge in this area but were asked how comfortable they were assisting patrons with it. Respondents were also asked how knowledgeable they were about Peer Review of Electronic Search Strategies (PRESS); however, because PRESS is a tool intended to help information professionals review database search strategies designed by other information professionals, respondents were not asked about their comfort level supporting library patrons with its use.

Confidential data was stored in password protected folders to which only members of the research team had access. Data was de-identified for sharing by removing potentially identifying variables such as liaison areas, institution name, and all open-ended responses, before sharing on OSF. For information about how disciplinary areas were defined, see OSF at https://osf.io/mqxf2/. Descriptive analysis was conducted for each close-ended question included in the survey. Responses provided in the free-text questions were coded into broad themes.

A statistical consultant was hired to complete more sophisticated statistical analysis to identify potential relationships between variables. The statistical consultant who conducted the data analysis for this project signed a pledge of confidentiality, as required by

the authors' institutional research ethics board, to ensure the security of participant data. The most appropriate method of statistical analysis for each question was determined by the statistical consultant. Two potential relationships were explored: first, between the types of learning activities participants engaged with and the number of SRs they had supported and, second, between the attitude respondents' administrators held towards SR support and which types of support were available to them to participate in training. The former relationship was examined using Spearman's correlation coefficient, and the latter through cross tabulation.

Results

There were a total of 379 responses, 161 of which met inclusion criteria and proceeded to the analysis stage, while the remainder were deleted. Ninety-eight respondents supplied the name of their institution. Forty-two of 108 (38.8 percent) US-based ARL institutions and twenty of thirty-one CARL institutions (64.5 percent) were represented in the survey. Of the forty-two ARL institutions, thirty-eight (90.4 percent) were R1 (Doctoral institutions – very high research activity), three (7 percent) were R2 (Doctoral institutions – high research activity), and one (2 percent) was an M1 (Master's Colleges and Universities: Larger programs) institution. Thirteen (87 percent) of the CARL institutions represented in the sample were a part of the U15 – Canada's collective of fifteen research-intensive institutions.[24] De-identified study data is freely available online at OSF at https://osf.io/mqxf2/.[25]

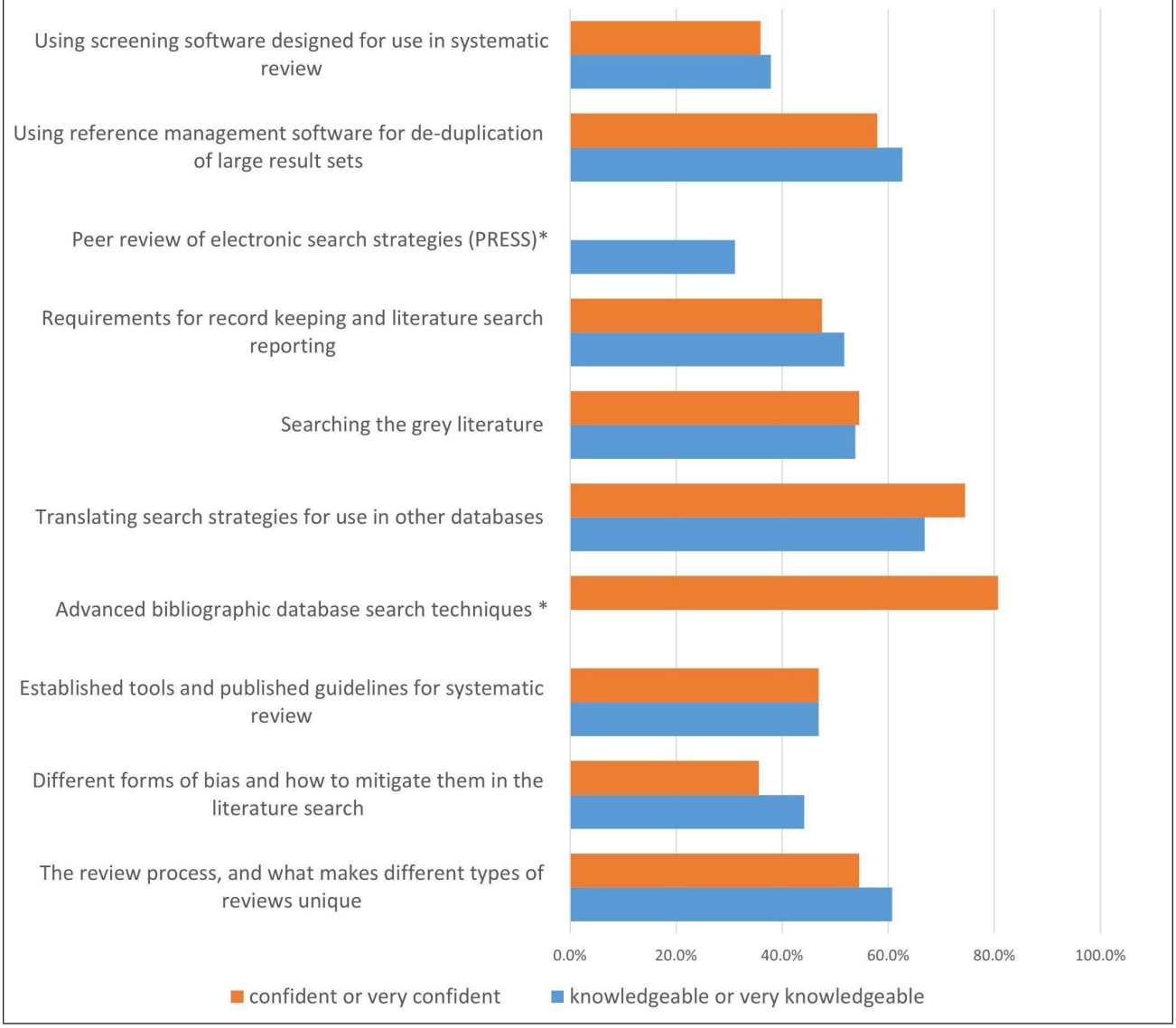
As respondents were able to list multiple disciplines they supported, 521 total areas were reported. These were assigned to broader disciplinary categories as described in the Methods. Seventeen percent were Humanities, 41 percent were Social Sciences, 32 percent were Sciences, and 10 percent were Health Sciences.

Knowledge and Confidence Relating to Aspects of SRs

When asked to indicate their knowledge of, and confidence in supporting patrons with, several aspects of SR support, respondents typically reported similar levels of knowledge and confidence for specific aspects of SR support listed in both the Knowledge and Confidence questions. However, for most aspects of SR support, respondents indicated slightly lower levels of confidence in their ability to help patrons with that element than their reported level of knowledge (see Figure 1).

As Table 1 indicates, respondents were most confident helping library patrons with activities related to database searching, with 117 (80.7 percent) indicating they were confident or very confident helping patrons with advanced database searching techniques, and 108 (74.5 percent) confident or very confident with the aspect of translating search strategies for use in other databases. More than half of respondents indicated that they were knowledgeable or very knowledgeable of the following: the review process, and what makes different types of reviews unique (60.7 percent); translating search strategies for use in other databases (66.9 percent); searching the grey literature (53.8 percent); requirements for record keeping and literature search reporting (51.7 percent); and using reference management software for de-duplication of large result sets (62.7 percent). Respondents indicated that they were least knowledgeable about peer review of electronic search strategies (PRESS), with sixty-two (42.8 percent) indicating they were not at all knowledgeable, and using screening software designed for SRs, with forty-nine (33.8%) indicating they were not at all knowledgeable.

FIGURE 1
A Comparison of Reported Knowledge, vs Reported Confidence Related to Specific Aspects of SR Support (Percentage) Starred (*) items have no comparator



Training

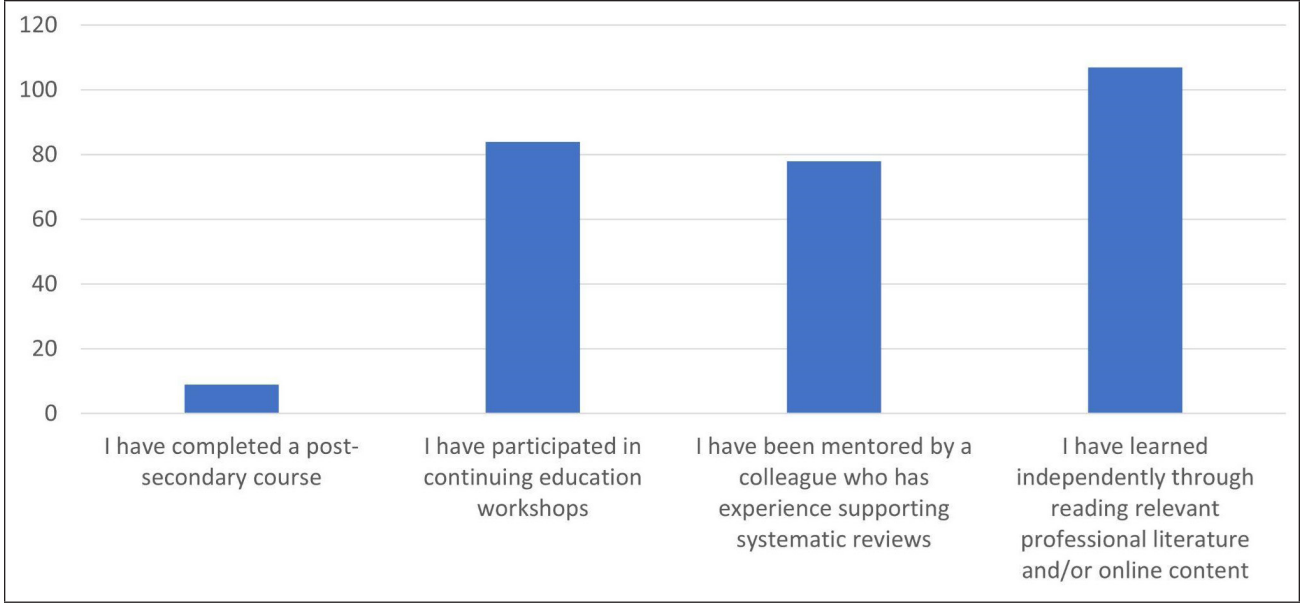
Training can take many forms, whether it is self-directed, as part of informal learning groups, or as part of much more structured professional development. Librarians were asked to identify what, if any, training on SRs they had already completed. Figure 2 below shows that 82.6 percent of respondents (120) had previously participated in at least some form of learning activity related to systematic reviews. These activities included: independent learning through reading relevant professional literature and/or online content (66.5 percent; 107 respondents); participating in continuing education workshops, including webinars (52.2 percent; eighty-four respondents); mentorship from a colleague who has experience supporting SRs (48.4 percent; seventy-eight respondents); and completing a postsecondary course, including MOOCs (5.6 percent; nine respondents). Of the remaining respondents, twenty-three (16 percent) said they had not received any training whatsoever, and four (3 percent) were unsure. Multiple responses were possible for this question.

TABLE 1
Reported Levels of Knowledge about, and Comfort with, Aspects of SR Support (Count (Percent))

	Not at all knowledgeable	Somewhat knowledgeable	Knowledgeable	Very knowledgeable	Not at all confident	Somewhat confident	Confident	Very confident
The review process and what makes different types of reviews unique	11 (7.6%)	46 (31.7%)	56 (38.6%)	32 (22.1%)	22 (15.2%)	44 (30.3%)	46 (31.7%)	33 (22.8%)
Different forms of bias and how to mitigate them in the literature search	24 (16.6%)	57 (39.3%)	43 (29.7%)	21 (14.5%)	42 (28.8%)	52 (35.6%)	34 (23.3%)	18 (12.3%)
Established tools and published guidelines for systematic review	20 (13.8%)	57 (39.3%)	44 (30.3%)	24 (16.6%)	37 (25.5%)	40 (27.6%)	43 (29.7%)	25 (17.2%)
Advanced bibliographic database search techniques	—	—	—	—	10 (6.9%)	18 (12.4%)	42 (29.0%)	75 (51.7%)
Translating search strategies for use in other databases	10 (6.9%)	38 (26.2%)	41 (28.3%)	56 (38.6%)	11 (7.6%)	26 (17.9%)	47 (32.4%)	61 (42.1%)
Searching the grey literature	14 (9.7%)	53 (36.6%)	55 (37.9%)	23 (15.9%)	21 (14.5%)	45 (31.0%)	49 (33.8%)	30 (20.7%)
Requirements for record keeping and literature search reporting	26 (17.9%)	44 (30.3%)	37 (25.5%)	38 (26.2%)	39 (26.9%)	37 (25.5%)	35 (24.1%)	34 (23.4%)
Peer review of electronic search strategies (PRESS)	62 (42.8%)	38 (26.2%)	24 (16.6%)	21 (14.5%)	—	—	—	—
Using reference management software for de-duplication of large result sets	15 (10.3%)	39 (26.9%)	46 (31.7%)	45 (31.0%)	22 (15.2%)	39 (26.9%)	36 (24.8%)	48 (33.1%)
Using screening software designed for use in systematic review	49 (33.8%)	41 (28.3%)	27 (18.6%)	28 (19.3%)	60 (41.4%)	33 (22.8%)	29 (20.0%)	23 (15.9%)

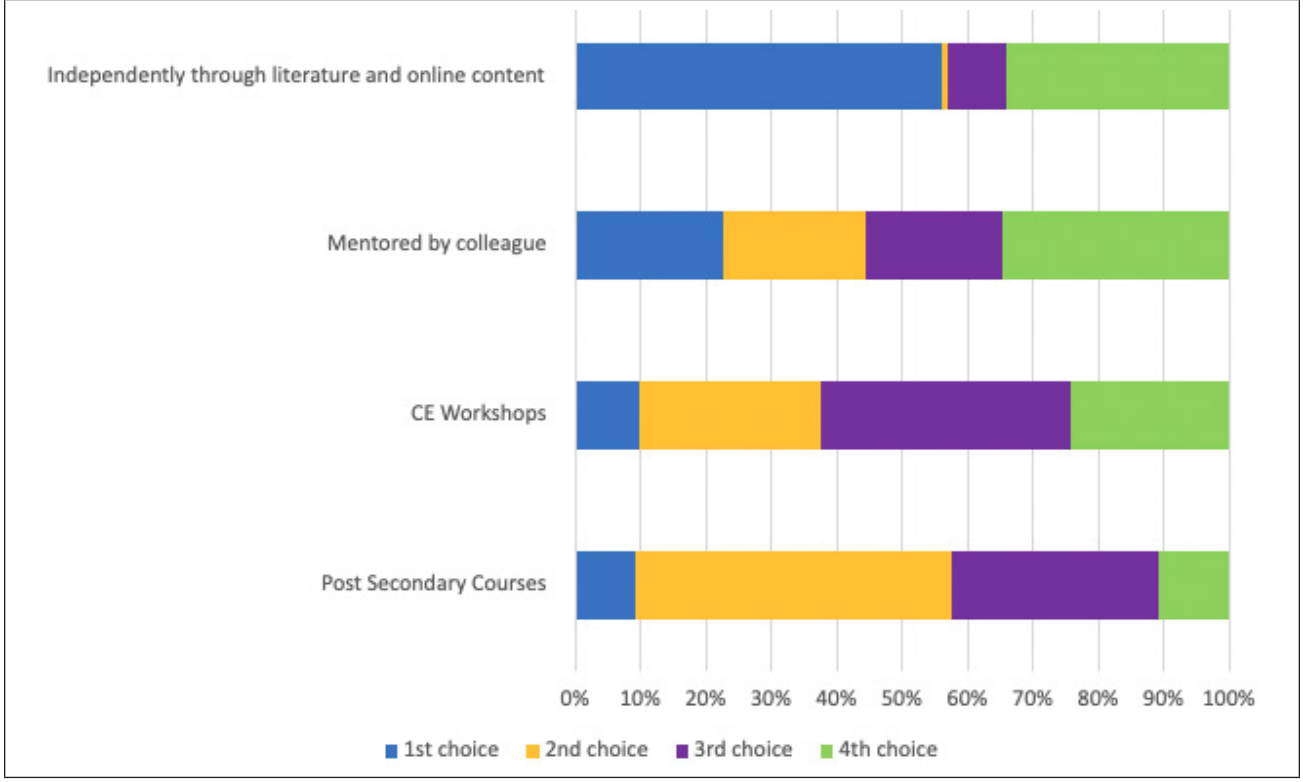
In addition to indicating whether they had participated in any learning activities related to SRs, respondents provided their preferred way to engage in that type of learning. There were 120 responses for this question. As shown in Figure 3 (below), learning independently through literature and online content was the first choice for 56 percent; second choice for 0.9 percent; third choice for 9 percent; and fourth choice for 34 percent. Being mentored by

FIGURE 2
SR Learning Activities Completed by Respondents (more than one response possible)



colleagues was first choice for 23 percent; second choice for 22 percent; third choice for 21 percent and fourth choice for 35 percent. CE workshops was the first choice for 10 percent; second choice for 28 percent; third choice for 38 percent and fourth choice for 24 percent. Post-secondary courses was the first choice for 9 percent; second choice for 48 percent; third choice for 32 percent and fourth choice for 11 percent.

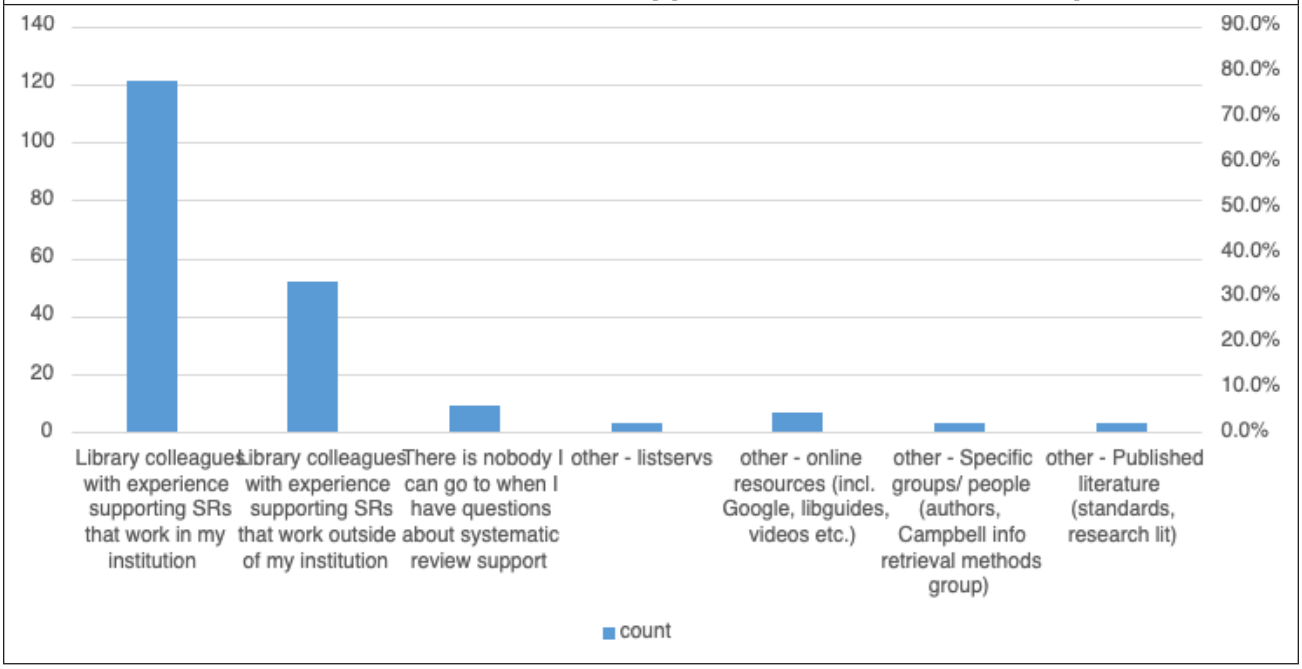
FIGURE 3
Preferred Mechanisms for Receiving SR Training



Where to Go For Help

When asked who they would go to if they had questions about SR support, the majority of respondents indicated that they would approach library colleagues who have experience supporting SRs, either working within their institution (79.6 percent) or outside of their institution (34.2 percent) (see Figure 4 below). Nine respondents (5.9 percent) indicated that there was nobody they could turn to for help. Other places respondents would go to when help was needed were: online resources, such as LibGuides, videos, or Google (4.6 percent); listservs (2 percent); publications (2 percent); or recognized authorities on SR methods, such as journal authors or research methods groups (2 percent).

FIGURE 4
Where to Go for Questions about SR Support (more than one answer possible)



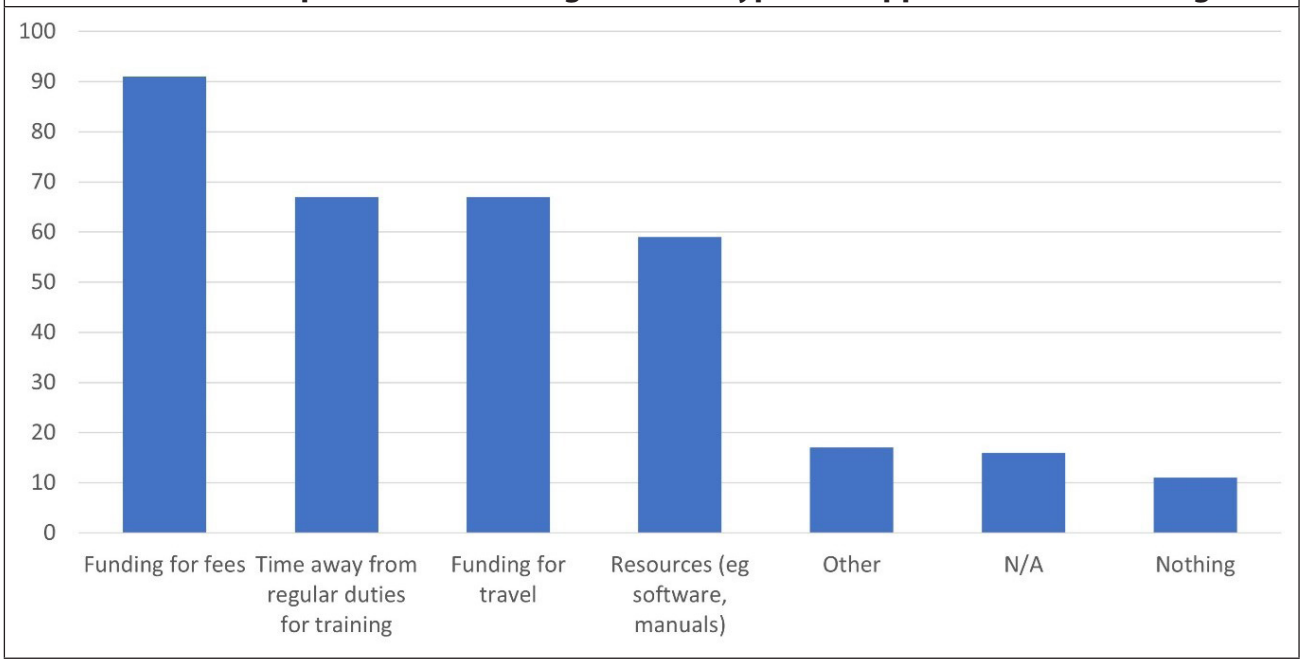
Supports for SR Training

Respondents were asked to indicate what types of support (if any) they had received from their administration for SR training (see Figure 5). The most common type of support was fundings for fees (e.g., registration fees) at 61.9 percent (91); time away from regular duties to participate in training at 45.6 percent (67); funding for travel at 45.6 percent (67); and resources such as software or manuals at 40.1 percent (57). Eleven respondents (7.5 percent) reported never receiving training support, and sixteen (11 percent) indicated that the question was "not applicable." Seventeen respondents (11.6 percent) selected "Other;" the most frequent response noted in "Other," at 5 percent, was local training provided by health librarians (seven), followed by local discussion groups at 1 percent (two).

Administration Attitude and Support

Respondents were asked a variety of questions about administration attitude and support towards SHSS librarians' participating in SR projects. Statistical analysis done on these results show that regardless of administration attitude (discouraging, neutral, supportive) funding

FIGURE 5
Number of Respondents Receiving Different Types of Support(s) for SR Training



for SR training programs and time away from regular duties to attend training is provided for between 50-69 percent of respondents. Librarians who report a discouraging attitude towards SRs from administration also less frequently report funding travel to attend SR training and access to training resources (e.g., manuals, software). Administration with a perceived neutral or supportive attitude provides travel funding 48 percent and 40 percent of the time, and access to training resources 54 percent and 24 percent of the time, respectively. Administration that is seen as supportive or neutral of participation provides time away from regular duties to attend training (58 percent and 30 percent, respectively). Librarians who report their Administration is discouraging of participation also report being provided with time away from regular duties to participate in SR training at the highest rate (80 percent).

Learning Activities Completed and Number of Systematic Reviews Completed

Spearman's correlation coefficient was calculated to examine the relationship between the types of learning activities respondents had completed and the number of SRs they had completed. A correlation was found between respondents who had completed continuing education (.391), mentorship (.267), and independent learning (.429) with the number of systematic reviews completed; the correlation was significant at the 0.01 level. No significant correlation was found between those who had completed post-secondary courses and the number of systematic reviews they had done in the last five years.

Topics to Learn More About

Free-text answers were provided by 115 respondents when asked about additional topics they would like to learn more about. Some indicated that they would like to receive training on elements of support related to literature searching and liaison work, namely grey literature searching and documenting the search (twenty-five), advanced searching (seventeen), peer-review of search strategies (ten), search strategy translation (seven), automation for

things like text mining and search strategy development (four), and deduplication of result sets (three). Thirteen respondents wanted to know more about how to effectively liaise with students and researchers who are interested in conducting SRs, and fourteen wanted to learn about applying for funds to support librarian involvement in SRs. However, the topics most frequently mentioned related to SRs themselves. The most frequent topic noted (thirty-three) was the need for greater awareness of and training on software tools to help in the SR process–- whether they are for deduplication, screening, data extraction, appraisal, or reporting (e.g., Covidence, Rayyan, DistillerSR, MaxQDA, and OpenRefine). Twenty-five respondents indicated a need for additional training on identifying and minimising bias. Other topics of interest included choosing appropriate review types (ten), writing and registering protocols (seven), critical appraisal (six), and data extraction (four). Six respondents noted that they needed general information on the applicability and relevance of SRs outside of health, both as a tool for themselves and in discussions with researchers or students.

Additional Comments

At the end of the survey, respondents were able to provide additional free-text comments if they had anything else they wanted to add. Several respondents here noted that additional training was needed, saying, for example, "I don't have enough regular experience with doing systematic reviews to feel confident;" "I'd like to shadow experienced SR colleagues as they work through the process;" and "I think that librarians in the social sciences would greatly benefit from having training aimed at their disciplines and also dedicated time at work or relief from other responsibilities to provide good support in this area." Others advocated for increased mentorship or shadowing between librarians with more SR experience and those without it.

Another theme revolved around the similarities and differences between SRs in SHSS and the health sciences. Some noted concern that while shadowing health librarians might be helpful, it does add to health librarians' workload or that health librarians might be quite separate (geographically) from their non-health librarian colleagues. Others pointed out that health librarians are not as familiar with SR methods or processes used in non-health disciplines. That being said, a background in health sciences was seen as a benefit to helping non-health researchers by others, with one respondent noting, "I started my career as a health sciences librarian and became familiar with systematic reviews at that time. Since then, I have moved to more SS/Humanities support, but am able to use the systematic review knowledge that I gained in my previous position to help current users." Relatedly, several respondents indicated they were still unclear on how SRs applied to their work as humanities liaison librarians, with one wondering whether they would be supported in this type of work by their institutions and another noting that the nature of humanities scholarship requires that researchers do this kind of work themselves. Another respondent noted that SR methods need to be more inclusive in general, as SHSS reviews can't always follow the same process as health SRs.

Respondents also mentioned the need for a deeper understanding among graduate students and faculty members in the SHSS of the role of SRs, as well as the work required to complete them. One respondent noted "It seems that almost all graduate students today feel like they have to author a systematic review for every MS and PhD program; simply not true and many topics don't warrant it." Another respondent noted that it was difficult to support researchers doing SRs when the librarians don't have access to the relevant tools, such as Covidence or DistillerSR, or the training needed to use these tools properly.

Finally, those who had received some form of training, such as at University of Michigan's Systematic Review Workshop, extolled the benefits of the training and their subsequent ability to then mentor their own institutional colleagues. Three respondents noted that due to the increased demand in SR requests, they had been hired specifically into institution-wide SR librarian roles.

Discussion

SR methods are being used in a variety of Science, Humanities, and Social Science disciplines and demand for library support for these projects has been increasing.[26] Individual librarians' degree of interest in supporting such projects may differ, but a basic understanding of SRs and the types of support they require is useful—after all, one never knows when that first request for SR support will be received. The information gathered through this survey indicates that librarians serving the Sciences, Humanities and Social Sciences have been taking steps to learn about various aspects of SR support, but more training opportunities are needed to increase their confidence in providing support to faculty, researchers, and students. The authors were surprised that respondents who indicated that their administration discouraged librarian involvement in SRs also reported that they were allowed time away from their regular duties to participate in SR training more frequently than respondents whose administrations were neutral or supportive of librarians providing SR support (80 percent versus 30 percent and 58 percent respectively). It is possible that these librarians have more autonomy when it comes to deciding how to spend time that is available for continuing education, but conclusions cannot be drawn from the data collected here. It is also interesting to note that even though the primary mode of support librarians receive for learning about SRs is funding and time away to participate in formal continuing education activities, this was not the first choice for most respondents. This is consistent with Premji and colleagues' findings that the business librarians participating in their study generally preferred informal learning opportunities, such as self-directed reading and on the job mentoring by other librarians, to formalized training.[27] There is no one-size-fits-all approach to learning so a combination of learning options is desirable, but administrators may consider facilitating opportunities for more peer-to-peer mentoring and shadowing for SHSS librarians to gain knowledge and experience. This approach would be consistent with examples of successful training programs documented in the literature.[28] While mentoring or shadowing more experienced librarians is a good approach, administrators should be cautious not to over-burden librarians who have an abundance of their own SR work to complete. A train-the-trainer approach, such as used by the Evidence Synthesis Institute[29] is likely a more sustainable strategy.

One theme that emerged from participants' free text responses was whether and how SR methodology, tools, and standards used in the health disciplines translate to other disciplinary contexts. Health librarians have benefited greatly from the availability of accepted SR standards such as the Cochrane Handbook and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and these types of guidance are needed in other disciplines as well. The Methodological Expectations of Campbell Collaboration Intervention Reviews (MECCIR) for Conduct and Reporting are excellent examples of this in the Social Sciences but are currently primarily relevant for interventional studies.[30] Other resources, such as Gough et al.,[31] provide an overview, but may be too broad in focus to provide guidance for specific disciplines. Areas like Business tend to draw upon highly cited meth-

odological articles for methods guidance,[32] but stand-alone articles cannot act as a substitute for the accountability and methodological rigour of an official guideline. The Collaboration for Environmental Evidence's (CEE) Guidelines for Knowledge Synthesis Methodologies in Environmental Management[33] is a good example of a more standard SR methodology in a specific discipline. The continued development of standards tailored to individual disciplines, and the work necessary to maintain and keep them up to date is significant but need not be done in isolation. SHSS librarians may find opportunities to partner with subject specific research centres and contribute to furthering SR guidelines in SHSS.

Another issue noted by some respondents was how best to navigate challenging conversations in an area in which they have limited experience. This can include how to advise researchers on the best type of review to take on, how to dissuade patrons when an SR is not the appropriate type of research in their situation, how to educate on correct methods and reasonable time frames for project completion, and how to advocate for proper acknowledgement of a librarian's contribution to the work. Building confidence in negotiating these conversations may take time; in the meantime, a useful approach is for librarians to familiarize themselves with tools and resources to which patrons can be referred. For example, online tools such as Right Review[34] can prompt students and researchers to carefully consider their research question and the appropriate approach to take to answer it. In planning timelines, gathering concrete evidence on the time needed,[35] or making use of online time estimators[36] can be helpful. In terms of acknowledgement, clearly outlined expectations around acknowledgement are beneficial. Many libraries now have acknowledgement expectations listed on their website[37] or require researchers to confirm that they have read co-authorship requirements before proceeding.[38] Beginning with agreed upon roles, expectations, and timelines will ensure a much smoother and stronger research partnership.

Pointing students and researchers to clearly outlined tiers of services and expectations ahead of a first meeting,[39] requiring requestors to upload completed protocols prior to a consultation,[40] and negotiation between faculty members and library deans or directors on how to make SR assignments reasonable for both students and librarians[41] are all ways to ensure that everyone is on the same page prior to starting a new SR. It is noteworthy that this study showed that just over half of respondents (53.1 percent) reported being less knowledgeable and less confident ("not at all" or "somewhat") about established tools and published guidelines for SRs. Training time might then be well used in learning about these tools and learning to develop clear policies.

Limitations

This study has several limitations that should be considered. The sample size of 161 responses is small, which limits the conclusions that can be drawn as well as how broadly they can be applied. Participant recruitment efforts relied on the use of listservs to recruit a convenience sample because the authors' Research Ethics Board would not permit directly contacting individual libraries or librarians. This limits the generalizability of results on a large scale or to other institutions. The survey was also limited to librarians working at ARL or CARL institutions. However, as described above, many participants not from ARL or CARL institutions were interested in completing the survey and were excluded. Future research should include librarians that support SRs in the SHSS, working at any academic institution; this would both increase the sample size, and provide a more comprehensive picture of librarian support for SRs in these disciplines.

Another possible limitation is the categorization of a librarian's liaison area(s) into the broad categories Humanities, Social Science, and Science for the purposes of maintaining participant anonymity and identifying broader trends. This is an imperfect process that is open to interpretation, particularly in multidisciplinary areas (e.g., Biomedical Computing) or those that may be classified differently at different institutions (e.g., Kinesiology). However, broad categorization was necessary to maintain participant anonymity and facilitate data analysis.

A final limitation of this study is that SHSS librarians who have not been asked to support SRs in their liaison areas, or who serve disciplines where this methodology is rarely used, may not have considered completing a survey on systematic reviews because they did not believe it to be relevant to them. SHSS librarians who are already supporting or thinking about supporting SRs could have been more likely to fill out the survey, which may mean they were overrepresented in the sample, giving that group more of a voice on the issue of SR support in the sciences, humanities, and social sciences.

Conclusion

Demand for and interest in librarian support of SRs in the SHSS is evident. This research has shown that overall, SHSS librarians have some knowledge of the SR research process but may have slightly lower confidence levels in providing support for research teams. To further develop both expertise with and confidence in supporting SR research, additional training is required. Participant responses suggest that there is no single ideal training format that works for everyone, so those planning training efforts should be mindful that a mix of approaches would likely work best. In terms of content, training should focus less on areas of traditional librarian expertise (e.g., advanced searching, search translation, differentiating review types, grey literature searching, and deduplication) and more on areas in which respondents indicated they needed more support (e.g., PRESS, protocol registration, screening software, different forms of bias and how to mitigate them in the literature search, and familiarity with tools and guidelines for systematic reviews). It is also clear that more education is needed on the applicability and relevance of SR methods and standards outside of health. Administrators or educators providing training should be mindful that any training, professional development, or mentorship must be tailored to the group taking part, as different disciplines have different SR needs and requirements.

Supplemental Material

All supplemental material, including survey instrument, listservs contacted, and anonymized data are available on the Open Science Framework at https://osf.io/mqxf2

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Contributorship

M.L., C.J.N, & J.W. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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Designing and Implementing a Community-Engaged Research e-Library: A Case Study for Adapting Academic Library Information Infrastructure to Respond to Stakeholder Needs

Lea Efird-Green, Eve Marion, Diane Willis, Jennifer M. Gierisch, and Leonor Corsino

The Duke University Clinical and Translational Science Institute Community Engaged Research Initiative (CERI) created an e-Library in 2018. This e-Library was developed in response to requests from academic researchers and the community for reliable, easily accessible information about community-engaged research approaches and concepts. It was vetted by internal and external partners. The e-Library's goal is to compile and organize nationally relevant community-engaged research resources to build bi-directional capacity between diverse community collaborators and the academic research community. Key elements of the e-Library's development included a selection of LibGuides as the platform; iterative community input; adaptation during the COVID-19 pandemic; and modification of this resource as needs grow and change.

Introduction

An e-Library, an electronic or digital library, is a collection of topical or reference materials, including resources that can only be accessed digitally (i.e., through subscriptions, hyperlinks, or e-books), and those scanned from hard copies.[1] An e-Library is designed to be accessed electronically either online, over the internet (e.g., website), or through other non-networked technologies (e.g., information kiosks).[2] They are often more easily accessible to a wider array of remote or community users and can be utilized with minimal or no support from librarians or other service providers.[3] An e-Library can be updated and organized frequently and by multiple contributors, reduce the cost of maintaining physical resources, and allow institutions and communities to collaborate from anywhere in the world.[4]

In the context of community-engaged research, an e-Library is a novel and innovative tool to disseminate research information and to build capacity.[5] Community-engaged re-

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search (CEnR) is defined as a process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting their well-being.[6] It empowers community members to be involved in setting research priorities, as well as building relationships among researchers and community members to better achieve research aims and improve real-world implementation.[7] The CEnR approach expedites new innovations in health equity, population health, and other research by prioritizing multi-stakeholder cooperation, especially among historically underrepresented groups.[8]

CEnR requires intentionality in the dissemination of information that is easily accessible by the community to promote these innovations.[9] Information is a valuable resource and can increase researcher and community knowledge and capacity, including their understanding of and ability to engage in CEnR.[10] Dissemination of information easily accessible by many individuals makes e-libraries such an attractive option for sharing information regarding community-engaged research. Libraries play a special role in the creation of CEnR resources, as well as facilitating researcher-community relationships; they are institutions that are by their nature interdisciplinary and stakeholder-engaged.

An e-Library can be created using a variety of software or database programs. LibGuides, proprietary software produced by Springshare and marketed to Duke and public libraries since 2008, has traditionally been used within educational settings, serving as topic and course guides for Duke students.[11] Because LibGuides is easy to use and widely available,[12] the format can also be adapted to organize electronic resources,[13] for community-oriented training and education,[14] and has even been used as part of social justice movements[15] and emergency response strategies.[16] Although alternative platforms exist, such as Weebly, LibGuides is the overwhelming choice of academic and community libraries in the United States and beyond.[17] Given its adaptability for use within both academic and community settings, LibGuides can: organize and present information to a variety of audiences[18] and be updated frequently; be created collaboratively; and can include both academic- and community-related content.[19] The creation of e-libraries to address the need to share content related to community-engaged research that is developed collaboratively and that includes the voices of academic and community voices is not the norm, to our knowledge.

In this article, we share key elements of the development of an e-Library used to facilitate community-engaged research capacity building. We address the following: the rationale, selection, and use of LibGuides software; iterative community input regarding content and structure; adaptation during the COVID-19 pandemic; and modification of this living resource as organizational and client needs grow and change. We also address the implications of this case study for other institutions and future directions for research.

Rationale for an e-Library Focused on Community-Engaged Research

Duke CTSI's Community Engaged Research Initiative (CERI) was established in 2016. CERI's purpose is to: provide programs and tools to enable community-engaged research (CEnR) and spur collaborations and innovations; enhance local, regional, and national capacity for community-engaged research; and improve knowledge and information sharing to foster trust and transparency in research.

CERI staff and faculty conduct CEnR consultations with researchers and work closely with community-based organizations and coalitions with the overall goal of facilitating bi-

directional capacity building with academic and community partners. During consultations, staff wanted to be able to find and share CEnR resources quickly with stakeholders. This need increased after receiving feedback from clients and collaborators, including community members, stating that they did not know where to look for, nor did they have access to, the information needed to be able to work effectively with academic research partners. Barriers for community members included being unable to access materials and having little awareness of free resources (e.g., PubMed Central). At the same time, academic researchers from within the institution also sought a single site to obtain trusted, high-level CEnR information to enhance their skills and knowledge of best practices in participatory approaches. Barriers for academic researchers included a lack of expertise regarding community engagement practice and methods, and limited knowledge of trusted resources. Therefore, CERI was motivated to identify and organize available resources to serve both client populations, and to support staff and faculty working with researchers and community members.

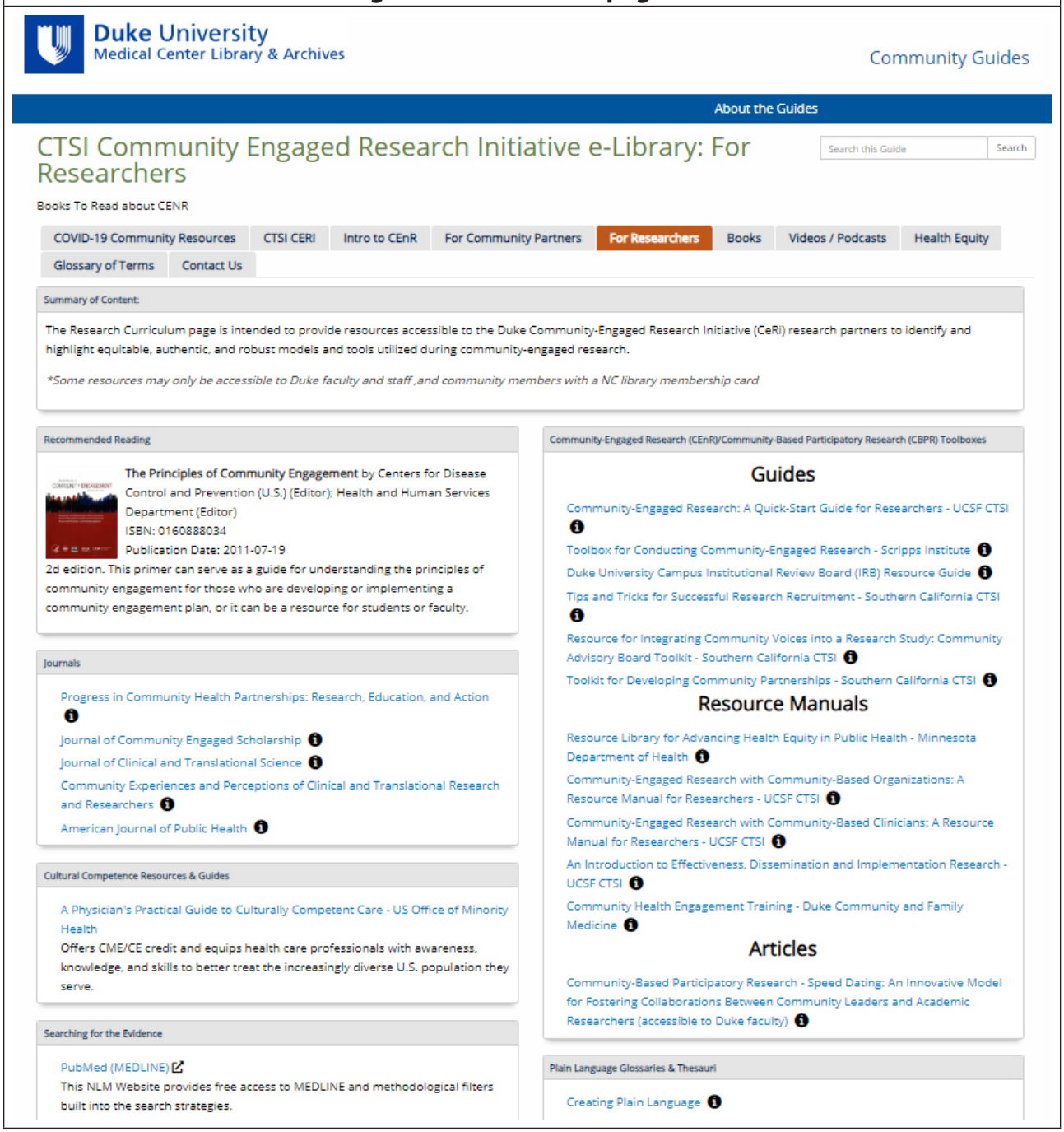
Initial e-Library Development

Before the e-Library's development in 2018, the team had compiled and stored a list of forty trusted sources of CEnR information in an Excel spreadsheet. While brainstorming ways to share this vetted information with academic and community partners, the team envisioned transitioning the spreadsheet to a website format. During planning for this transition, the team sought the advice of a Duke Medical Center librarian to discuss possible solutions and to identify the best platform for the transition from an Excel spreadsheet to a site that would easily be accessible by both community members and academic researchers. This initial consultation resulted in the team choosing LibGuides as the online platform.

There is precedent both within Duke and in the literature of using LibGuides to serve community audiences, in addition to academic institution affiliates.[20] Duke LibGuides policy also emphasizes the importance of external utility, which matched CERI's goal of making a resource repository that would serve academic researchers and lay community members. The Duke Medical Center Library hosts each guide, and CERI's staff update and maintain the guides through an online account. Guides can be drafted and vetted internally before launch and may be updated in real-time without the need for constant librarian support and oversight. Managing online resources without librarian oversight made a LibGuides-based e-Library ideal as resources could be added and modified promptly in response to community needs.

After determining that resources could be housed in a LibGuide and made available for community members without an institutional affiliation, input was solicited from CERI's community advisory council and other partner organizations, community leaders, and academic researchers regarding specific resources to include, as well as content, layout, and usability concerns. A preliminary prototype was then presented to CERI's community advisory council which offered verbal and written feedback during a live feedback session and through an electronic survey. This process informed the architecture of the guide. Including a recommended reading from staff and community partners tab, a "frequently asked questions" section, and a "suggest a resource" form linked on the homepage were among the changes that were suggested and later implemented. The community advisory council also recommended dissemination methods such as linking the e-Library on CERI website and promoting it in CERI's newsletters and staff email signatures. They also—presciently—warned that too much information is just as "painful" to navigate as too little information.

FIGURE 1
A Partial Screenshot of One of the Pages from Ceri's Original E-Library. As is evident here, many researcher resources are only accessible via institutional login. Each tab in the top of the image leads to a similar page of resources



Resources were organized into tabs that included a landing page about CERI, an introduction to CEnR, and separate tabs for researchers and community members. In response to suggestions from community partners regarding usability, new sections were incorporated: a glossary of terms and acronyms; separate tabs for books, videos, podcasts; and funding opportunities. The intent of this architecture was to segment content for the intended audience to increase the usability and overall utility of the resources. A "Contact Us" tab was also

included to encourage users to submit questions about the e-Library content or to participate in any programs or services offered by CERI. Most e-Library resources were developed by other organizations, and as such, they were appropriately hyperlinked and credited.

Adapting to the COVID-19 Pandemic:

Given CERI's mission and connection to the community, the e-Library was not meant to be a static resource once it was created. Before 2020, the e-Library developed organically with CERI staff and community collaborators frequently making recommendations to incorporate new materials. This process changed rapidly in response to the COVID-19 pandemic. In April 2020, in response to the dearth of information, CERI's community advisory council urged CERI to quickly adapt the e-Library to share trusted and reliable information about the COVID-19 pandemic, as well as relevant community resources. This resulted in a new resource section that included: links to clinical research studies; the most current and reliable epidemiological data on COVID-19 spread; COVID-19 vaccination data; information on COVID-19 prevention; volunteer opportunities to provide food and other essentials to those most severely impacted by the pandemic; and COVID-19 testing and vaccination sites within the county in which Duke is located. The e-Library also listed organizations aiding community members during the pandemic, including housing, food, and employment assistance. The content was organized according to its geographic relevance (national, state, or local), and much of it was available in English and Spanish.

As COVID-19 evolved, CERI sought to once again adapt to the "new normal." During the pandemic, the number of resources available in the e-Library had grown considerably, from about seventy-five to over 170. Though the resources were separated by topic using tabs, they had outgrown the single LibGuide that comprised the e-Library. Additionally, the necessary focus on the COVID-19-related resource page had hindered the maintenance of community engagement and CEnR resources, leading to many proposed resources and other changes waiting to be internally approved by CERI staff. This was also complicated by the speed at which COVID-related information was changing, leading to a huge burden on staff to maintain and include the most up-to-date and accurate information about the pandemic. Although the guide was used—having 3,067 visits in 2020 and 2,873 in 2021—viewership declined month after the summer of 2021. Additionally, many of its resources were no longer the most up-to-date sources for COVID-19 information locally or nationally.

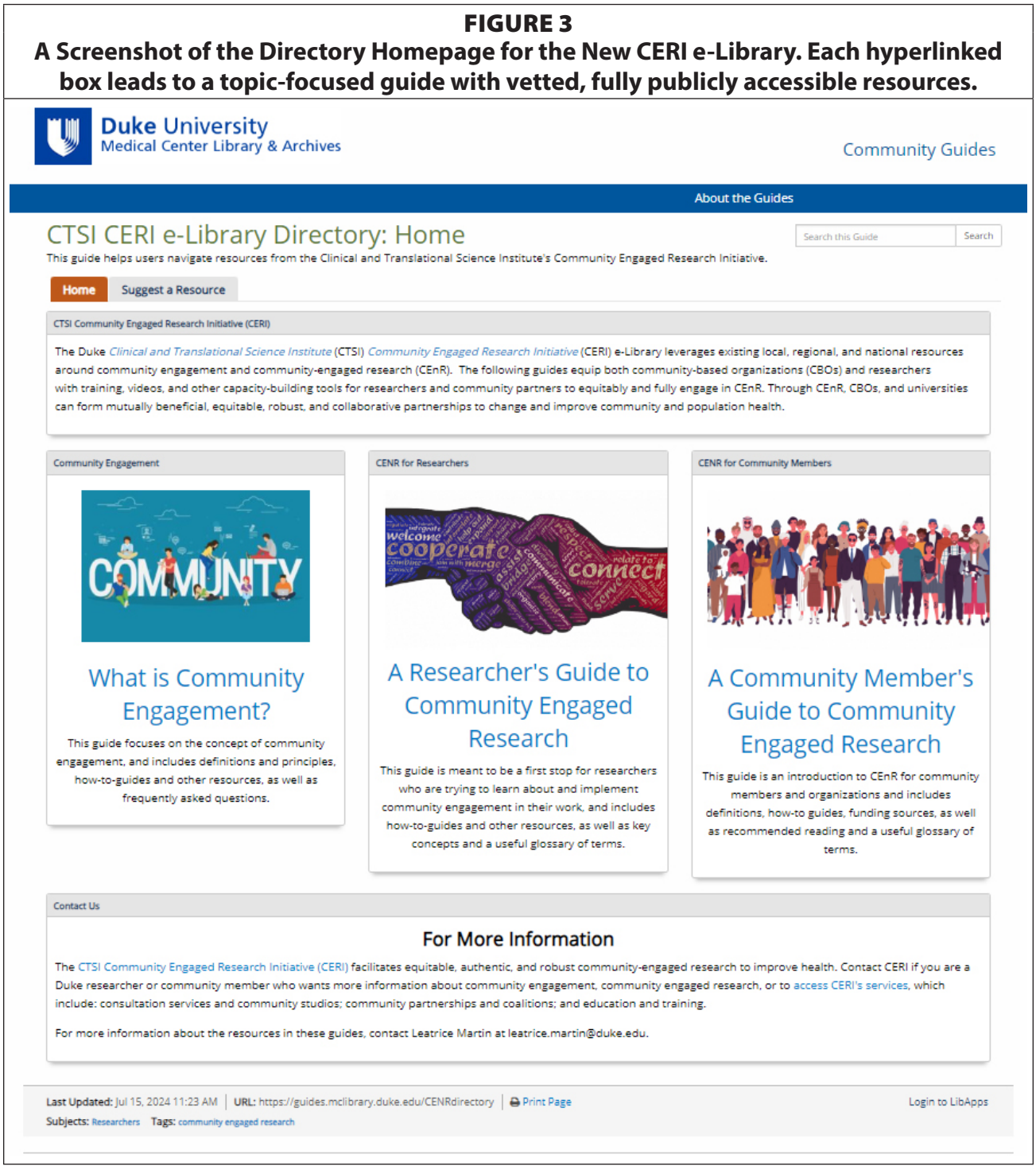
To make the e-Library more accessible and usable, CERI staff and faculty again consulted with a Medical Center librarian about how best to modify the existing content. The librarian recommended that the e-Library be split into a series of related topical LibGuides. The resulting three LibGuides' subjects are: What Is Community Engagement; Community-Engaged Research for Researchers; and Community-Engaged Research for Community Members. All three guides, and any future ones, are linked to a simple directory guide that includes the "Suggest a Resource" form. These guides received a combined 1,323 views from January to October 2022, which is impressive given that most views for the old guide came from the COVID-19 resources page. Therefore, it can be assumed that although the views are lower, more people encounter information about CEnR in the revised guides.

Resources displayed in the original e-Library and new resources were reviewed and, if still relevant and suitable, added to the appropriate guide. COVID-19-related resources were relocated to a preexisting Duke Medical Center Library guide of clinical and com-

FIGURE 2
A Partial Screenshot of CERI's e-Library's COVID Information Page. Resources in Spanish are available further down. During the subsequent redesign, community COVID resources were relocated to a preexisting Duke Medical Center Library guide

munity COVID-19 resources, which is regularly maintained and directly links to reliable sources of up-to-date information (e.g., Centers for Disease Control and Prevention). Once this process was complete, fifty-five unique resources remained in the e-Library, along with helpful charts and diagrams and a glossary of CEnR terms. Although a natural drift of scope and purpose occurred over time, these revisions to the e-Library represent a pivot back to the original guidance that CERI's community partners offered when it was initially developed.

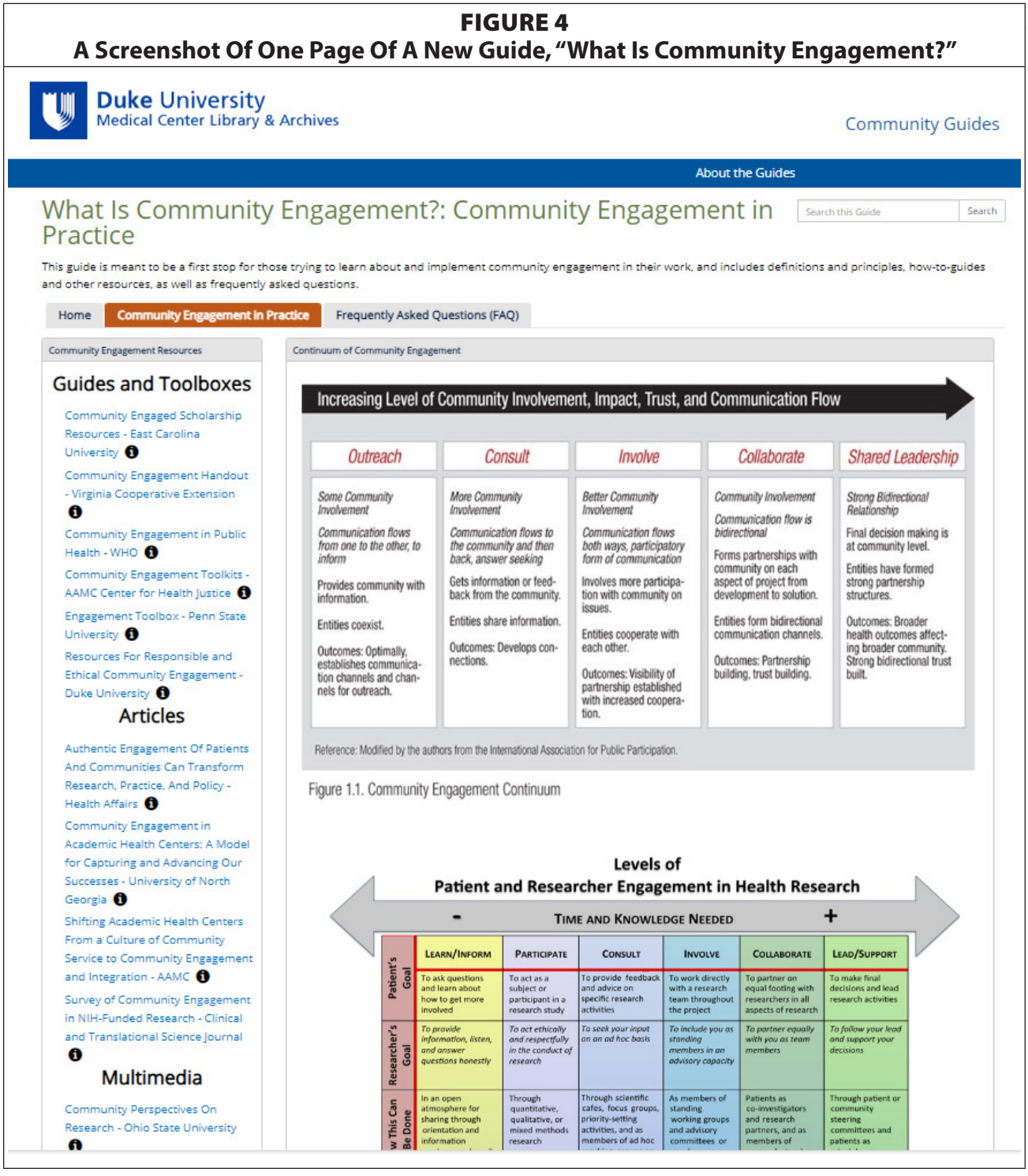
FIGURE 3
A Screenshot of the Directory Homepage for the New CERI e-Library. Each hyperlinked box leads to a topic-focused guide with vetted, fully publicly accessible resources.



To ensure that the e-Library remains a user-friendly and accessible resource for all, a new vetting process was implemented in December 2021, as the revised e-Library was launched. This vetting process included a two-stage review of suggested materials conducted by CERI staff and faculty, as well as the development of guidelines for the inclusion of new materials. Existing materials are now reviewed quarterly by CERI staff and yearly by library staff. All current and future materials must be:

- Different from previously posted content

FIGURE 4
A Screenshot Of One Page Of A New Guide, "What Is Community Engagement?"



- Directly related to the topic of the guide
- Free and publicly accessible without institutional access
- Layperson-friendly
- Housed on a stable, trustworthy website
- Ideally five or fewer years old
- Credited appropriately in the hyperlinked resource title

These criteria will help ensure that CERI's e-Library stays true to its mission of providing trusted resources about community engagement and community-engaged research, while emphasizing equity and ensuring public access for both academic and community partners nationwide.

Discussion

Lessons Learned

The e-Library's success depends, in many ways, on the software used to develop and maintain it. The LibGuides platform helps the e-Library accomplish its goals by:

- Increasing access to resources for internal and external users
- Having a simple and straightforward layout, so that the software is easy for staff to learn and content can be regularly updated
- Allowing content and templates to be reused in multiple tabs or guides
- Including the capacity to embed video clips, gallery boxes, book covers, diagrams, or other media to make content stand out
- Having the ability to obtain real-time insight into system usage, including hits on guides and individual assets
- Being supported by institutional technical support and guidance

Additionally, the LibGuides platform augments CERI's ability to be responsive to stakeholder and community requests and concerns, and to broaden the impact of these resources regionally and nationally. Without the existence of the e-Library and the quick changes made possible by the LibGuides format, CERI could not have responded as efficiently to stakeholder needs during the pandemic. Moreover, the inclusion of resources developed by other institutions' Clinical and Translational Science Awards Centers and community-based organizations breaks down the silos between academia and community and among institutions.

Implications for the Field

Through compiling and publicizing the important work being done in community engagement and CEnR across the country, CERI endeavors to lift up the voices of those at the forefront of community engagement implementation and innovation. This has implications for other academic institutions that may want to implement an e-Library to bolster their community engagement efforts. Primarily, developing this resource would mean:

- Identifying stakeholders: Does the academic library have a research team, department, or center at the institution that is interested in or conducting CEnR? Is there a relationship, or could there be, among community members and organizations and the institution's research infrastructure? How can the potential audience be consulted while creating and maintaining the e-Library?
- Identifying resource aims: What are the goals of the e-Library (for example, informing, disseminating, making connections among stakeholders)?

- Identifying institutional capacity: Are there other resources on campus that could augment a CenR e-Library (for example, a funding program, a community advisory board)? If so, can collaboration among these parties be established?

Libraries establishing a CEnR-related resource should also consider how the traditional values and norms of academic librarianship would be implicated in its creation. For example:Academic centers and libraries collaborating directly to create resources – Traditionally, LibGuides are primarily used in academic libraries as course or subject guides and aimed at students and other institutional members. These guides are usually created and maintained by librarians, who are responsible for managing their content. However, CERI's e-Library is an example of a resource created collaboratively between an academic center and a Duke library. Maintained by CERI staff, it does not create additional burden for librarians, while also sharing institutional resources interdepartmentally to create a wider variety of content for an expanded user base.

- Expanding the definition of a library "user" – Academic libraries are, understandably, most focused on serving the students, faculty, staff, and visitors of their institutions. However, as many universities expand their definition of "community" to include the geographic communities in which they are located, libraries get the opportunity to do the same. This allows them to adapt and expand their resources for new users in the broader community, rather than solely focusing on members of the institution.
- Emphasizing free and equitable access to information – Libraries are, at their core, devoted to access to information. However, this information, particularly in academic spaces, is often inaccessible to those without Duke affiliations. Although institutions must be mindful of their capacity to provide expensive resources to non-institutional community members, they can still act as information brokers through e-libraries and other tools. Librarians and academicians can work together to present freely accessible, evidence-based information to users who may not have formal research training and experience. In this way, academic libraries can help further the democratization of information to a wider audience—those who do not have the privilege of being a member of an academic institution.

Limitations

As with any software, LibGuides has limitations that can impact their usability,[21] especially for a resource as large as CERI's e-Library. Additionally, LibGuides' ease of use can tempt creators into creating more resources than they can realistically maintain, negatively impacting their effectiveness.[22] Some such limitations include:

- A simple, relatively inflexible layout that has limited capacity for visual appeal
- The risk of the e-Library becoming a "dumping ground" if resources are not consistently evaluated, updated, and/or culled
- Accessibility concerns, e.g., lack of hyperlink underlining, color contrast, and other tools used by those with visual impairments and other disabilities.[23] These must be resolved either with customized code on the part of the host institution, or by Springshare as a back-end solution.[24]

CERI will address these limitations through continuing to interface with our academic and community stakeholders to improve the e-Library's visual elements and content. In addition, the implementation of the new resource vetting policy and review schedule will ensure

that the e-Library's content remains publicly accessible, relevant, and easy to navigate for all users. At this time, LibGuide accessibility concerns are in the hands of the Duke Medical Center Library and are not controlled directly by CERI.

Implications for Future Research

Although outreach and engagement are primary missions of libraries and librarians, there is a lack of knowledge regarding how and when academic researcher teams and librarians collaborate to mediate and facilitate community engaged research. More research is needed on how academic libraries can work with other institutional centers, as well as on how departments can not only collaboratively create resources, but also directly facilitate CEnR and other community engagement strategies.

E-libraries, including ones built using LibGuides, are promising but underutilized tools in the community engagement literature, representing an opportunity to prioritize user-friendliness and information accessibility. Such resources could bridge gaps in knowledge between community members and academic partners through a transparent interface, if community members are able to substantively involve themselves in their creation. More research is needed on the effectiveness of e-libraries for community-oriented projects, and how they can best be adapted for community use.

Conclusion

As CERI continues to adapt and respond to the continued need for credible public health research information and increase community engagement—particularly in historically marginalized communities—the e-Library will continue to be a vital first stop for those interested in learning about CEnR. E-libraries and LibGuides both thrive when they are cared for; like relationship between communities and researchers, they need collaboration, coordination, and consistent upkeep in order to remain useful.[25] CERI's e-Library is able to adapt with the times—evolving from a simple spreadsheet, to a trusted way to get local information about the pandemic, to a series of topical guides with the potential to expand to other CERIs across the Duke's Clinical and Translational Science Awards Center.

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Embracing the Metaverse: A Survey of Virtual Reality and Augmented Reality Practices at the United States' Top One Hundred University Libraries

Yajun Guo, Shuai Li, XinDi Zhang, Yiyang Fu, Yiming Yuan and Yan Quan Liu

The purpose of this study is to learn more about virtual reality (VR) and augmented reality (AR) practices at the United States' top one hundred university libraries, as well as how they are engaging with the metaverse. We conducted qualitative and descriptive analysis on the websites of the top one hundred university libraries in the United States to determine the application fields and application proportions of VR and AR technologies and found good practice examples of using VR and AR technologies in this field. The findings show that 86 percent of the top one hundred US university libraries have implemented VR and AR technologies, with practice areas focused on: VR/AR studio and VR/AR makerspace; immersive learning services and virtual exhibitions/conference services; visual geographic information system and VR navigation services; virtual reading services and visual retrieval services; and VR reference services. The study provides university library administrators and professionals with the most up-to-date information and best practices of VR and AR engagement areas and the proportion of use, which can aid in the development of strategies to leverage VR and AR technologies to improve patron service and embrace the metaverse for the communities they serve.

Introduction

A number of incidents have led the metaverse to the forefront of global attention, including Roblox going public as a metaverse stock in 2021, Facebook renaming itself Meta and making the virtual reality social platform—Horizon Worlds free to users aged eighteen and up in the

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United States and Canada. The metaverse is like a digital universe, creating a virtual environment similar to various scenarios in the real world: a world where we can play games, go to shopping malls, travel, make friends. A world where people have their own virtual identities, perform a range of social activities such as socializing and working, and where people can get and create what they want. Accordingly, the metaverse has all the potential to be a significant concept and technology that will drive libraries in the future, leading to a transformation of libraries into highly immersive services, similar to how the internet has altered the way we live.

As early as 2003, certain university libraries in the United States developed virtual libraries in the online video game "Second Life" and offered a variety of services, marking the first practical research on metaverse libraries. The metaverse is regaining popularity nearly two decades later, and technological circumstances have improved. Today's metaverse is a collection of new technologies, including virtual reality (VR), augmented reality (AR), gaming, networking, etc. VR and AR are two of the most important metaverse enabling technologies, and their use in university libraries is growing.

Literature Review

The term "metaverse" first appeared in the science fiction novel *Snow Crash*, where it is described as a virtual universe that exists independently of the real world and where an individual can access as an avatar.[1] Zuckerberg describes the future of the metaverse as follows: "In the metaverse, you'll be able to do almost anything you can," and "you will be able to teleport instantly as a hologram to be at the office without a commute, at a concert with friends, or in your parents' living room to catch up."[2] After a year of development, Mystakidis believes that the metaverse is a post-reality universe, a perpetual and persistent multi-user environment merging physical reality with digital virtuality.[3] With respect to the library sector, most metaverse-related research that was identified was conducted primarily by Chinese scholars. Yang believes that VR, digital twins, artificial intelligence, and blockchain technology will be the technological directions worth exploring in the field of libraries science.[4] Guo proposes an application scenario for future library social education that is more intelligent, immersive, and interactive, arguing that libraries can develop social education in the metaverse form in four ways: enriching educational contents, promoting services parity, broadening educational forms, and achieving integration. Through the literature analysis as well as theoretical research, VR and AR are crucial technologies for realizing the metaverse by fully taking over patrons' sense of vision, hearing, touch, and motion capture to achieve information input and output in the metaverse.[5]

In 1935, the phrase "virtual reality" appeared in the novel *Pygmalion's Spectacles*. The book describes "Pygmalion's glasses," which enable the wearer to enter the world depicted in the glasses, allowing the individual to interact with people and things in the glasses world—people can touch them, listen to their voices, and smell them. In 1989, Jaron Lanier, founder of VPL, first proposed the concept of virtual reality and manufactured the first commercial VR product for market, but the $100,000 price hindered its popularity at that time. Now, VR is widely recognized as a simulation system developed by a variety of sciences and technologies, including network technologies, 3D modeling, and computer technologies, that creates a simulated world of user interaction and is presented or projected through wearable devices like the Oculus or HTC Vive.[6] Augmented reality differs from virtual reality in that AR superimposes computer-generated objects onto real-world scenes using computer-connected devices such as monitors or glasses, so that virtual objects appear alongside the real-world scene in the

user's field of vision.[7] VR and AR technologies are considered the most fundamental forms of the metaverse, as well as the technical infrastructure that allows the metaverse to be realized. Therefore, summarizing research on the application of VR and AR technologies in libraries can aid in the adoption of metaverse-related technologies.

Research on library's application and adoption of VR and AR technologies can be divided into three phases: theoretical discussion, expanding application, and popular application.

Theoretical Discussion

The "theoretical discussion phase" of VR and AR technologies application in libraries occurred between 1991 and 2006 and can be separated into three parts: concept introduction, tool application, and practical exploration. Initially, it was said that the experiencer could engage with an artificial environment created in the library, resulting in integration with the virtual scene.[8] Since then, several researchers have presented the concept of the virtual library, focusing on virtual libraries that are integrated with VR technology, as well as the importance of VR technology in the context of libraries. Poulter proposes the VR library, a novel type of online library that can be used in libraries that lack data repositories or are inaccessible to patrons.[9] Due to the lack of VR-related concepts in library science, Charles explains VR, including the correct and incorrect usage of the term, and concludes that VR technology has aided in the establishment of virtual libraries.[10]

As for tool applications, researchers have mostly anticipated the use of VR and AR technologies in information retrieval. Various retrieval tools and applications based on VR and AR technologies arose in this time period. For instance, the VR information retrieval tool VR-VIBE extends the retrieval process to a 3D form, allowing for more information to be visualized at once and enabling more powerful interaction capabilities.[11] ARLib can assist patrons in completing advanced searches in libraries by locating books on the shelves. However, a laptop, a head-mounted display with a FireWire camera, and Studierstube 2.0 software are required.[12] As for practical exploration, Chen suggests the idea of upgrading digital library user pages with AR technology and attempts to apply it to work in libraries.[13] Following that, a survey study at Texas A&M University's Sterling C. Evans Library found that VR can be a valuable tool for integrating "physical tours" and "web-based virtual tours, " allowing patrons to navigate, watch, read, listen, and access information from afar.[14]

Expanding Application

Between 2006 and 2010, there was an explosion of research on VR and AR technologies in libraries, which fell into the "expanding application phase." This phase was dominated by virtual library research, Second Life research, and application-specific research. Early virtual library research focused largely upon the overall architecture of virtual libraries, such as the system of virtual libraries and the design approach. After clarifying the overall architecture, researchers began to summarize the purpose, characteristics, functions, and future directions of virtual libraries, as well as suggesting principles and benefits of virtual library collections.[15] In Second Life research, Swanson argues that virtual environments based on Second Life revolutionize the delivery of information and services, as well as the sharing of information between librarians and library patrons.[16] Ferry evaluates the range of activities in Second Life, classifies it as "gray literature," and discusses the tools used to discover, document, and preserve it.[17] In terms of specific applications, Parhizkar investigates the use of AR technol-

ogy to preserve rare or special collection manuscripts in libraries, arguing that AR technology can model these valuable manuscripts and rare books and present them in a virtual format, allowing library collections to be better maintained.[18] Additionally, practical applications of VR and AR technologies emerged between 2008 and 2010, such as China's first VR system in the National Library in 2008, which became its promotional feature. Some university libraries in the US were also gradually improving their virtual library services in Second Life.[19]

Popular Application

Since 2011, VR and AR research has moved into the "popular application phase." With the widespread adoption of various smart devices, the maturity of VR and AR technologies in libraries, and a shift of focus of VR and AR application from resources to services, current research mainly explores problems with VR and AR applications, mobile terminals research, and surveys on VR and AR technologies. In terms of problems research, Chinese scholars advocate that the development and extension of VR technology should be prioritized in view of the current problems such as the low commercial value of VR devices and the immaturity of technology.[20] Massis describes the benefits of using VR and AR technologies in libraries in the future and argues that VR and AR technologies should not be used only as a way to attract patrons, but to improve the information literacy of patrons.[21] According to Hahn, while VR technology opens up many possibilities for libraries, most VR technologies have not been professionally tested.[22] Hahn also notes that increased sales of VR products are contributing to the creation of virtual worlds and advises that the field of library science should not ignore this trend.

In terms of research on mobile terminals, Linoski conducted a study on the integration of mobile terminals and VR technology to evaluate their application in libraries and their impact on librarians, covering everything from smart watches, Google Glass, to GoPro wearable cameras. In terms of surveys on VR and AR technologies,[23] Oyelude investigates the usage of VR and AR technologies in libraries and museums, and found that Facebook was the leading investor in VR and AR technologies, with many people having the opportunity to try VR and AR technologies by using Facebook.[24] In a year-long study of the use of VR and AR technologies in academic libraries, findings revealed that 38 percent of American Association of Research Libraries (ARL) member libraries offered VR and AR services, with a focus on the use of Oculus and HTC Vive.[25] By investigating the VR experience area in the library of the Hong Kong Polytechnic University, Suen found that university libraries have limitations in terms of technical capabilities, spaces, and budget costs.[26]

Through the above review, we find that libraries are gradually maturing in the practices of VR and AR technologies. Although there is extensive research on relevant topics, further research on the latest practice of VR and AR technologies is still needed in the coming era. Moreover, how should university libraries use VR and AR technologies to embrace the metaverse era? This paper aims to address these questions to explore the under-researched areas. The researchers conduct a series of surveys to understand the current state of VR and AR practices in the top one hundred university libraries in the United States. After analyzing typical cases, this paper clarifies the future development of this field and makes suggestions for how libraries can embrace the metaverse.

Research Question

VR and AR technologies provide users with an immersive reading and learning experience

that enriches the form of information conveyed. Users can acquire and understand the knowledge and information in various types of literature in a more intuitive and vivid way. At the same time, virtual reality and augmented reality—as an important part of the metaverse—can provide an immersive virtual environment and broaden the service space and interaction mode of libraries, thus better satisfying users' needs. Therefore, this paper will sort out the application of virtual reality and augmented reality in university libraries and try to answer the following research questions:

1. What proportion of the top one hundred US University libraries have used virtual reality and augmented reality?
2. In which areas do they primarily use VR and AR to benefit their patrons?
3. How can university libraries employ virtual reality and augmented reality to embrace the metaverse?

By answering these questions, we hope to help libraries improve user satisfaction, expand information presentation, and provide references for the technology introduction of university libraries.

Method

Sample

This study uses both descriptive and qualitative methods to analyze the website content of the top one hundred university libraries in the United States.[27] We entered the words "VR/AR" in the library web pages of these schools, and the relevant content appeared as follows: "Virtual Map Services," "VR/AR Studio and VR/AR Makerspace," "Virtual Reading Services and Visual Retrieval Services," "Immersive Learning Services and Virtual Exhibition/Conference Services," and "VR Reference Services." We examined each of the websites from June 5 to July 13, 2022. Additionally, we conducted a secondary visit to the website to determine the authenticity and reliability of the data.

Approaches

The researchers conducted the analysis using the following steps:

1. Identify keywords to use in a search of the selected library websites (VR, AR, virtual reality, and augmented reality)
2. Utilize Google to search for "keyword + site: the university library website" and then open each of these library websites.
3. Enter keywords identified in Step 1 into the search box of the researched library website to identify how well they use these technology. If the websites could be searched to find appropriate locations where the school's libraries offered VR, AR, virtual reality, and augmented reality, or if it could be verified in the relevant news that the school's libraries offer these technologies, count that data and collect the various data needed for analysis.
4. As outlined in the first two research questions above.
5. Document the findings.
6. For library websites that did not give a direct answer, determine whether they used VR/AR devices by looking up their past events.
7. Have other members of our team repeat the above actions to ensure accuracy.
8. Double check and statistically evaluate the survey data.

Findings

A review of the websites of the top one hundred university libraries in the United States revealed that 86 percent used VR and AR technologies, while 14 percent did not mention it on their websites. Overall, 73 percent offered VR/AR studios and VR/AR makerspaces, 63 percent offered immersive learning services and virtual exhibition/conference services, 48 percent offered virtual map services, 42 percent offered virtual reading services and visual retrieval services, and only 31 percent offered VR reference services. Samples are given in Table 1 and the results are illustrated in Figure 1.

TABLE 1
Code List and Examples

Contents	Options	Example No. 1, Princeton University	…	Example No. 100, University of Colorado Boulder
Virtual Map Services	1. Visual Geographic Information System 2. VR Navigation Services 3. Neither	1		3
VR/AR Studio and VR/AR Makerspace	1. VR/AR Studio 2. VR/AR Makerspace 3. Neither	1, 2		1
Virtual Reading Services and Visual Retrieval Services	1. Virtual Reading Services 2. Visual Retrieval Services 3. Neither	1		3
Immersive Learning Services and Virtual Exhibition/Conference Services	1. Immersive Learning Services 2. Virtual Exhibition/ Conference Services 3. Neither	1, 2		1
VR Reference Services	1. Yes 2. No	1		2

VR/AR Studio & VR/AR Makerspace

VR/AR studios are venues where libraries provide equipment for patrons to experience VR and AR technologies, whereas VR/AR makerspaces allow patrons to not only experience VR and AR technologies, but also to innovate and produce utilizing the equipment provided. Among the one hundred American university libraries reviewed, 73 percent had VR/AR studios or VR/AR makerspaces. More specifically, 64 percent had VR/AR studios, 23 percent had VR/AR makerspaces, and 14 percent provided both. The results of the research are shown in Figure 2.

The prevalence of VR/AR spaces reflects focused attention on library space construction. For instance, Princeton University Library opened a makerspace that combines "making and innovation" with a variety of equipment for learning and exploration. The makerspace includes physical work areas such as "build and explore" and "print and create," with head-mounted and hand-held devices, 3D printers, and collaborative workstations in each of these areas.[28] Stanford Library set up VR workstations equipped with Oculus, HTC Vive, 3D printers,

FIGURE 1
Percentage of Top One Hundred University Libraries in the United States Using VR and AR Technologies

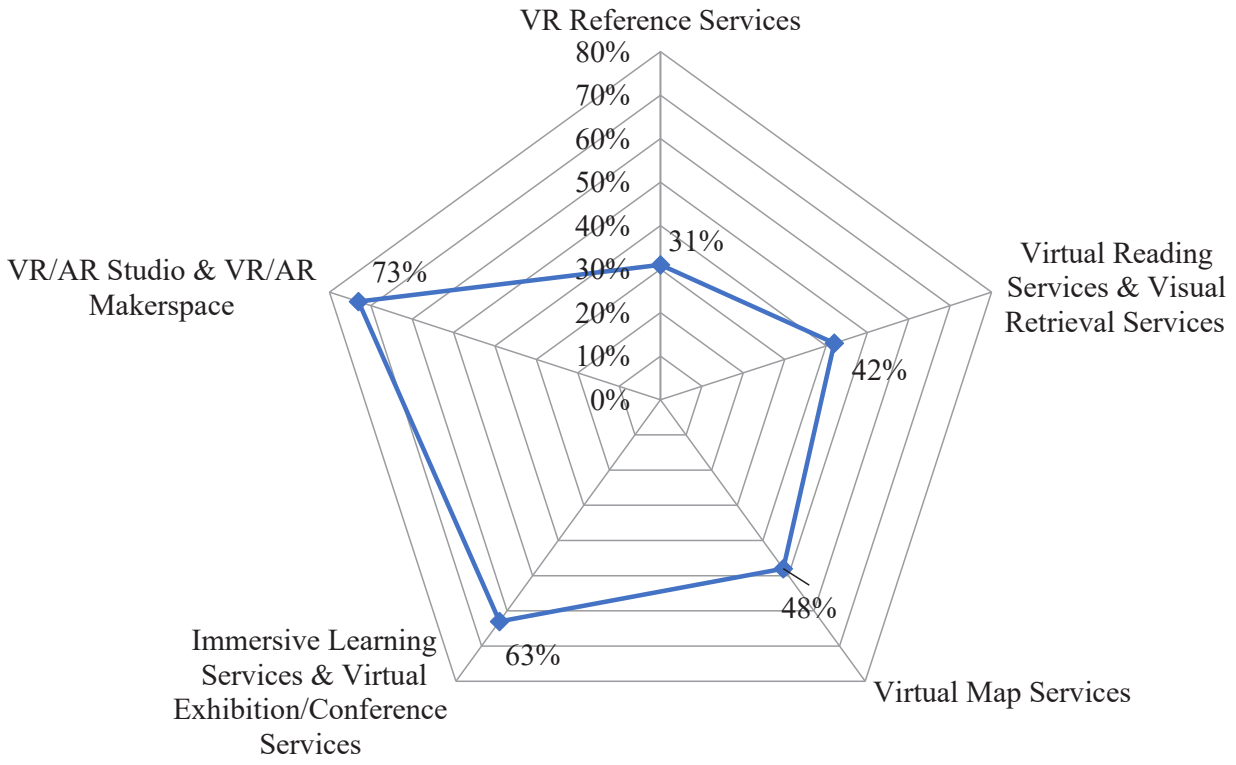
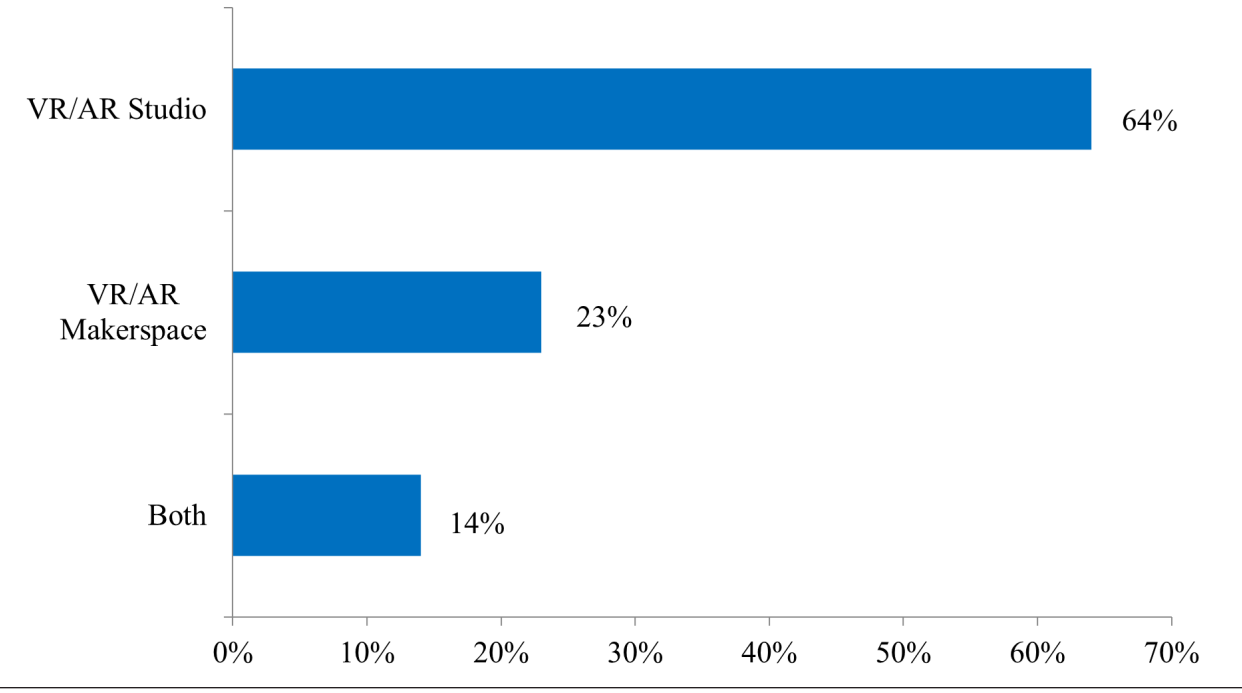
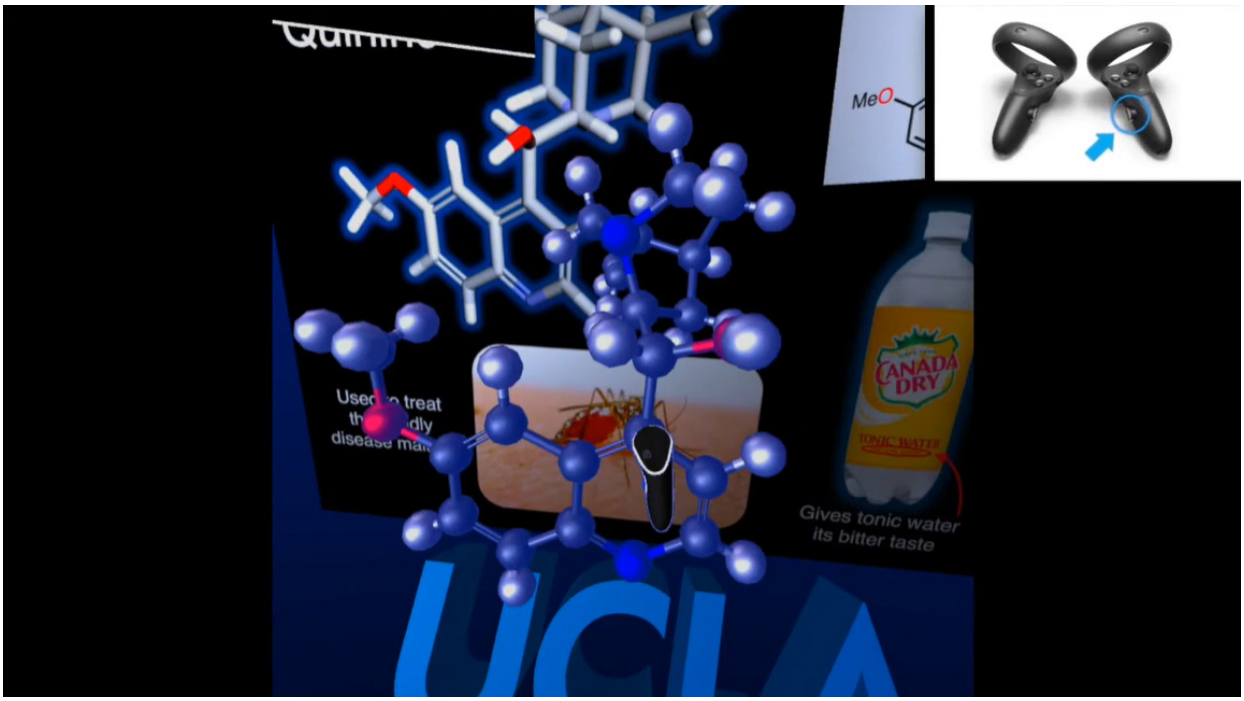


FIGURE 2
Percentage of Top One Hundred University Libraries in the United States With VR/AR Studios and VR/AR Makerspaces



and other devices, allowing patrons to experience life as a Stanford student through various devices.[29] The University of California-Los Angeles Garg Lab launched a VR immersive platform for chemical resources, where patrons can visualize various chemical elements that are not normally seen and can interact with organic molecules in 3D form to understand their relevance to daily life (see figure 3).[30]

FIGURE 3
Video Demonstrating Use of UCLA's VR Immersive Platform for Chemical Resources

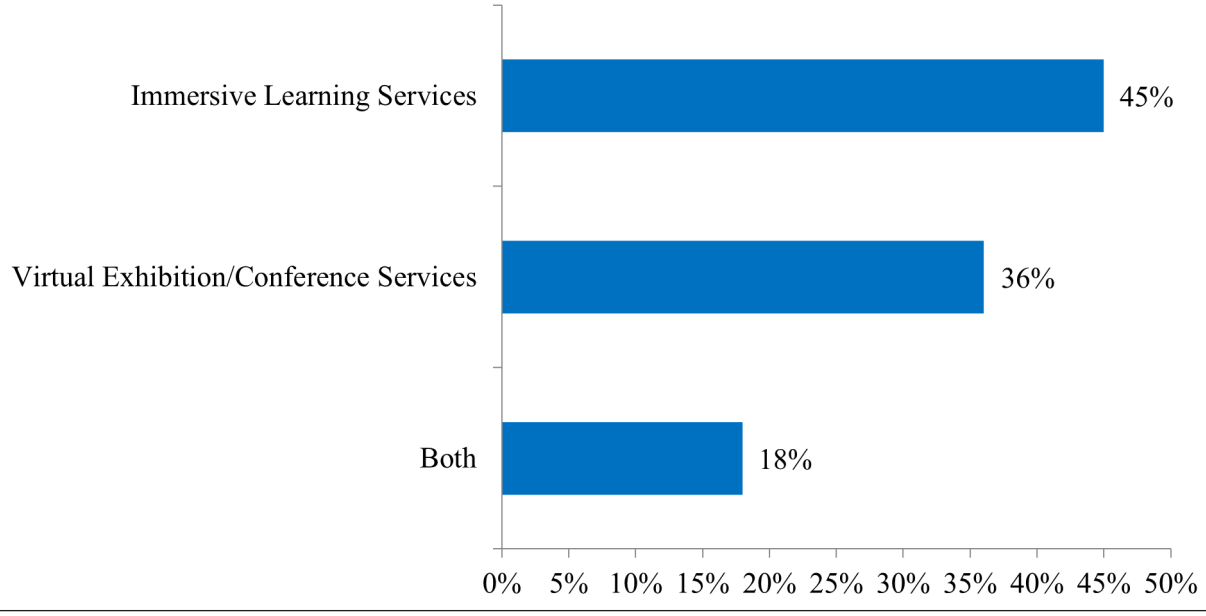


Immersive Learning Services & Virtual Exhibition /Conference Services

Immersive learning services are those in which libraries use VR and AR devices to enable patrons to enter virtual scenarios during the learning process, thus enabling deep learning. Virtual exhibition/conference services refer to the use of various devices to conduct 3D exhibitions of electronic or physical resources or provide conference services, allowing patrons to see realistic physical resources as well as enjoy face-to-face conference services without going to the library. Overall, 63 percent of libraries reviewed offered immersive learning services and virtual exhibition/conference services. More specifically, 45 percent of the libraries provided immersive learning services, 36 percent provide virtual exhibition/conference services, and 18 percent provide both services, as illustrated in Figure 4.

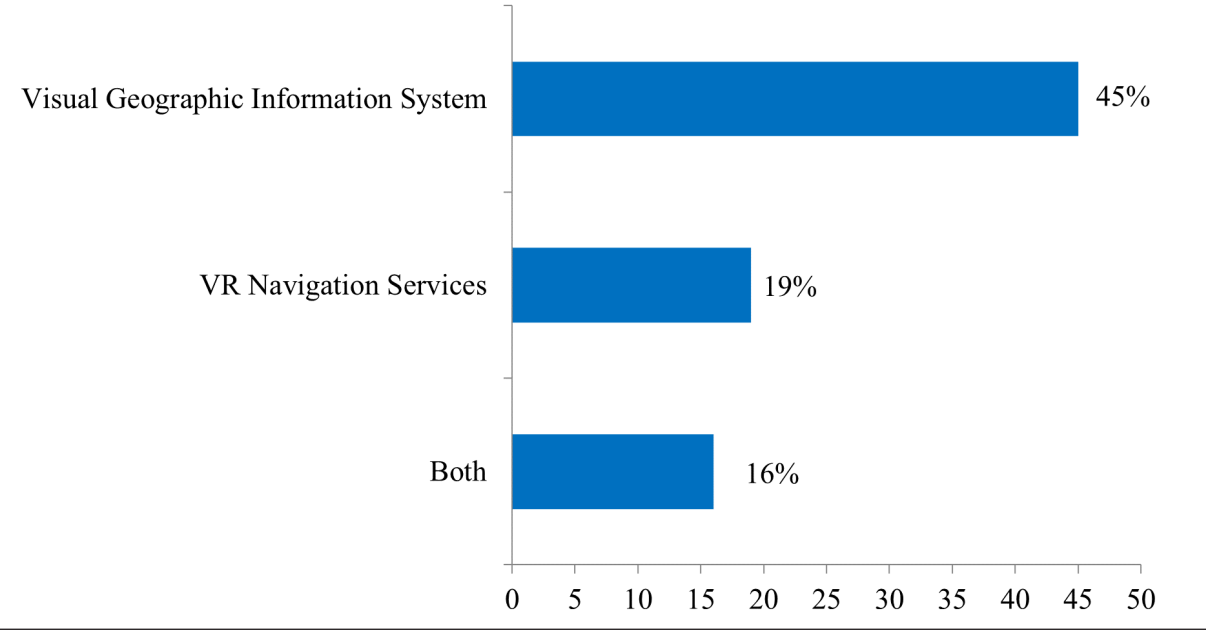
The noteworthy prevalence of libraries that provided immersive learning services (45 percent), reflects the importance of auxiliary teaching in the libraries. For example, the Stokes Library, a branch library of the Princeton University Library, offers both immersive virtual experiences and learning opportunities.[31] Virtual experiences include historical event experiences, practice in public speaking skills in front of virtual crowds, and participation in realistic interactive environments. The Stokes Library also provides assisted instruction, exploration, and visualization of learning data through VR and AR technologies. Columbia University Library uses real-time visual simulation technology to allow

FIGURE 4
Percentage of Top One Hundred University Libraries in the United States Offering Immersive Learning Services and Virtual Exhibition/Conference Services



patrons to explore built environments that no longer exist, and encourages experiential interpretation and innovative pedagogy involving cultural heritage sites.[32] The UC San Diego Library launches a virtual exhibition on the history of the Holocaust to the public, which deepened the public's understanding of the past while preserving the memories of Holocaust survivors.[33]

FIGURE 5
Percentage of Top One Hundred University Libraries in the United States Offering Virtual Map Services



Virtual Map Services

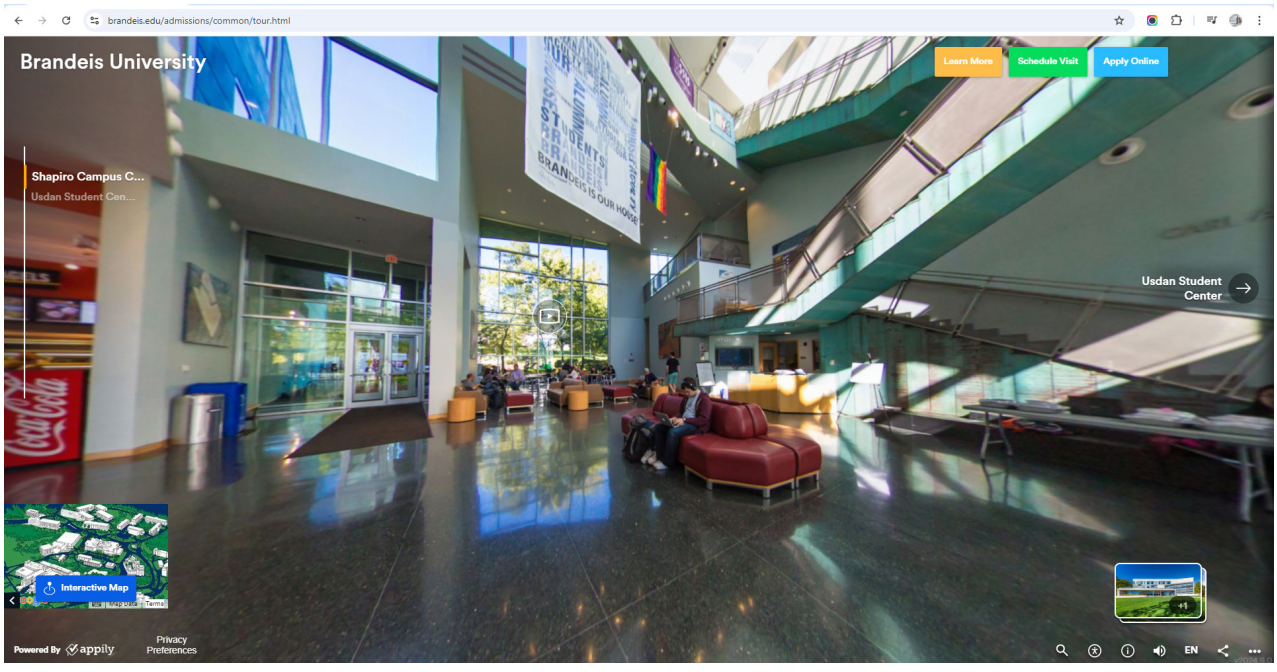
Early on, VR and AR technologies were widely used in Google Street View maps. With the development of interactive technology, an increasing number of libraries are currently providing virtual map services from which visual Geographic Information System (GIS) and VR navigation services have emerged. The visual GIS incorporates VR and AR technologies to turn the geographic environment into a 3D GIS; the VR navigation services serve as a virtual guidance service using VR technology, built upon the foundation of the visual GIS. Among the top one hundred university libraries in the United States, 48 percent offered virtual map services. More specifically, 45 percent provide visual GIS services, 19 percent provide VR navigation services, and 16 percent provide both, as shown in Figure 5.

US university libraries offer virtual map services primarily in the form of events that allow patrons to take a virtual tour of the libraries or campus. For example, Clemson University Library offers a visual GIS service that allows a virtual tour of every part of the university in full 3D.[34] Brandeis University Library utilizes wearable devices—such as the Oculus and HTC Vive—to allow students to be taken anywhere on campus to virtually experience labs, as well as other places that they may not be able to reach,[35] as shown in Figure 6. During the COVID-19 pandemic, some universities used VR and AR technologies to conduct activities such as virtual opening ceremonies and virtual orientation when they were unable to start school offline.

Virtual Reading Services & Visual Retrieval Services

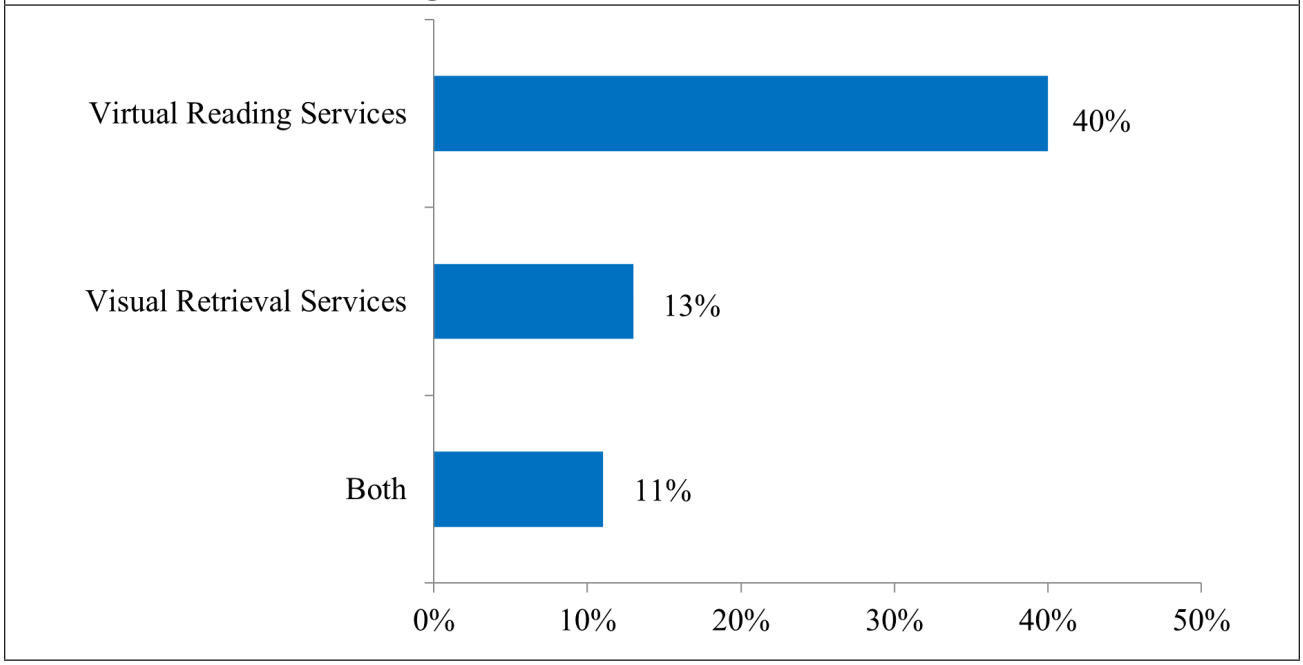
Virtual reading services refers to the use of 3D modeling to transform two-dimensional electronic resources into 3D form so that when patrons use VR and AR devices to read electronic resources, they can get the same experience as reading physical books. Visual retrieval services improve the efficiency of patrons' access to resources by displaying the library's resource

FIGURE 6
Virtual Tour Offered by Brandeis University Libraries



catalog in 3D form through VR and AR devices. Overall, 42 percent of libraries reviewed offered virtual reading services and visual retrieval services. More specifically, 40 percent of American university libraries provide virtual reading services, 13 percent provide visual retrieval services, and 11 percent provide both, as illustrated in Figure 7.

FIGURE 7
Percentage of Top One Hundred University Libraries in the United States Offering Virtual Reading Services and Visual Retrieval Services



Harvard University provides a virtual browsing function, offering the option of "shelf view" in the virtual library.[36] After entering the virtual library it is possible to preview the 3D model by index numbers, subject titles, library spaces, and to use this 3D virtual model to browse the documents in multiple branches. The University of Chicago Library uses AR technology to project texts from the core curriculum into public areas. For example, instructors and students selected twenty-nine excerpts from core course readings and then virtually projected these texts on the exterior walls of the University of Chicago to provide a unique course experience to the students.[37]

VR Reference Services

Reference services—an important component of library services—have gradually evolved into visualization reference services through provided the internet and smart devices. VR reference services mainly provide visual face-to-face communication services for patrons with contactless services. Visual reference services may improve the efficiency of librarians in solving problems; however, only 31 percent of the surveyed American university libraries provided VR reference services.

Although the prevalence of libraries that offering VR reference services in this study is limited, there are some universities that offer distinctive services. For example, Berkeley Library offers virtual reference services in healthcare that enable medical professionals in the field to communicate with physicians in a more intuitive way.[38] The University of Washington

Library offers searches by topic or major, which matches patrons with staff members who have related expertise based on their needs, enabling one-on-one visual virtual consultations. The University of Massachusetts Amherst offers virtual media advising, facilitating virtual reference among students and faculty staff through ZOOM, a cloud-based video conferencing software.[39]

Discussion

The researchers were surprised by the high prevalence of usage of VR and AR technologies among the top one hundred U.S. university libraries. According to the findings of the research, university libraries in the United States have made noteworthy progress in the use of VR and AR technologies, thereby creating opportunities for sustainable advancement.

The prevalence of VR/AR studios reached 64 percent in the surveyed university libraries. The construction of these innovative VR/AR spaces has brought about many new virtual library spaces and services, providing scenario support for the construction of metaverse virtual library spaces. The mature visual GIS service also provides an immersive experience for users. Activities such as virtual campus tours, or virtual library tours with high-definition panoramic roaming, will allow users to feel a strong sense of presence. Today's virtual tours also provide a practical basis for future immersive metaverse tours.

However, it is worth noting that the utilization rate of VR navigation services, VR/AR Makerspaces, and visual retrieval services is low. The practices of virtual exhibition/conference services and virtual reading services are not comprehensive, and the VR reference services need improvement. With the continuous development of technology, there is still room for improvement in university libraries. Therefore, based on the conclusions, this paper suggests that university libraries can provide support for the library construction of a metaverse in the future from four aspects: technology integration, auxiliary teaching, optimization of VR reference services, and virtual resources construction.

Promoting the Integration of Underlying Technologies

In the future, high-speed network connections will be able to support the vast number of application innovations needed for the metaverse. These applications will facilitate libraries in holding virtual exhibitions and online events using VR/AR that are realistic and immersive. Therefore, accelerating the integration of communication network technologies with VR and AR technologies should be prioritized. Moreover, a vast virtual geographic space is needed for patrons to choose and explore, which is inseparable from the role that artificial intelligence is likely to play in the metaverse-based libraries. In order to achieve the idealized metaverse-based library, the combination of artificial intelligence with VR and AR technologies is essential.

Adding Auxiliary Teaching Forms

According to the requirements of the metaverse, libraries need to be equipped with more immersive and resourceful education spaces, where patrons can digitally access a "twin model" of the physical education environment. In these virtual education spaces, patrons will be able to engage in immersive learning services based on virtual scenarios. Additionally, libraries may leverage the powerful cloud computing capabilities to import the visualized resources into the virtual education assistant and then save them to the intelligent data warehouse in the cloud, making it easier for patrons to access educational resources.

Optimizing Reference Services

VR/AR technologies could optimize reference services. For example, when patrons are seeking services, libraries could employ AR technology to make various services appear in front of them and then recommend additional related services based on their needs. When a patron's demands cannot be met, the libraries could set up a virtual one-to-one reference portal where the patron can have a real-time face-to-face interaction with an online librarian. When patrons have trouble finding resources, they could use remote help, where they would use wearable devices to summon librarians who could quickly retrieve the resources they need, and provide feedback so that patrons can find information resources more quickly and accurately next time.

Accelerating the Construction of Virtual Resources

There are two types of resources in most university library collections. One is the traditional print collection, which includes valuable original books, popular items, books that have become obsolete due to age, ancient books, and feature literature. The other is the university library's digital resource collection, which is likely to include databases and access to e-journals, e-book resources, and more. With a shift towards more digital resources, libraries could create virtual models to form virtual collections resources for teachers and students to query and read. Eventually these physical and virtual resources might be converted to a 3D format through VR/AR technology, while VR/AR devices may be used for daily activities such as children's picture book reading, online meetings, and multi-modal literature retrieval.

Conclusion

In order to understand the application of VR/AR technology in US university libraries we qualitatively and descriptively analyzed the website content of the top one hundred university libraries in the US. The results of the study show that there have been some excellent cases and practical applications of VR/AR application in American university libraries. These applications include helping teaching innovation in colleges and universities, improving the level of library subject services, and creating an immersive digital reading environment. However, the current application of VR/AR technology is still not widely popular at present, and the application of some specialized technologies appears slightly rough and homogenized. At the same time, this study was not verified by field visits due to geographical constraints, and the actual application of VR/AR technology may slightly deviate from the research results. The real-world application of VR and AR is rapidly changing with the continuous upgrading of library websites and media channels. With the maturity of technologies such as AI and Metaverse, the future of university libraries will usher in a new digital era. Students will be able to visit historical sites and conduct experiments to enhance their learning through virtual reality. The metaverse will break the limitations of geography and time, allowing people to explore and create freely in virtual space. The development of artificial intelligence will further promote the innovation and integration of technology. We look forward to this future full of opportunities and challenges, and together we will explore the infinite possibilities of digital libraries.

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Assessing Bibliographic Inaccuracy as a Contributing Factor for Unintended Loss in Shared Print Monograph Programs

Helen N. Levenson, Sara Amato, Ian Bogus, Fern E. Brody, Mary Miller, and Jacob Nadal

Shared print programs are helping their member libraries right-size their collections. As they do, there are concerns about the adverse impact of bibliographic inaccuracies. This paper studies bibliographic record inaccuracies and the resulting frequency of mismatches between an item owned and the record representing ownership. Through analysis of interlibrary loan (ILL) survey data, the authors found an overall low rate of bibliographic inaccuracy, and that inaccuracies rarely prevented library staff from verifying the ownership of the item. The authors review how this finding contributes to confidence in library holding records, which is necessary for evaluating the optimal number of copies in shared print networks and for minimizing the risk in withdrawal decisions.

Introduction

As the shared print community continues to grow and mature it has been finding creative ways for libraries to work together, not only to make resources more easily accessible, but also to ensure that the printed word is adequately secured for the future. During this growth, practitioners often ask about how many copies of a title need to be retained to ensure long-term access. While it appears to be a simple question, it inevitably becomes more complicated as one considers the variables that contribute to the determination of the minimal number of copies required. The types of risks and variables involved in being able to make this determination were explored in the C&RL paper "Everything Not Saved Will Be Lost"[1] in which Maiorana et al. stated, "The variables are known, but we can only identify the values of those variables through study and research."[2] The Partnership for Shared Book Collections[3] (AKA The Part-

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nership), a federation of 17 shared print monograph programs, convened a Risk Research Working Group* to further explore the issue of optimal number of copies. In doing so, the group has taken up the work of delving deeper into the unanswered questions raised in the Maiorana article, including the rate of inaccurate bibliographic records. In our study, we explored two topics arising from bibliographic inaccuracies: first, the frequency of occurrences of bibliographic mismatches and, secondly, how detrimental bibliographic inaccuracy might be to long-term retention in the context of shared print programs.

Bibliographic inaccuracy can be perceived to be a significant risk factor in shared print management. Librarians often use the number of copies listed in OCLC as a stand-in not only to identify how many copies are held in other libraries, but also as the basis for deciding to withdraw their own copies. This decision assumes that the number reported in OCLC is above their critical threshold for the number of copies that need to be retained. When evaluating how many copies need to be retained, print archiving programs also need to have confidence that bibliographic records match the objects they are supposed to represent. In meetings of the Partnership and its Risk Research Working Group, participants frequently expressed concern that there were significant problems related to bibliographic inaccuracy, especially with details such as edition statements. These may be attributable, for example, to matching algorithms used in retrospective conversion projects that transformed card catalogs to electronic records in bulk.

The risks inherent in bibliographic inaccuracy can play out in two ways. First, catalogers may have created a new record unnecessarily leading to a proliferation of separate records for items that are, in reality, the same work or edition. Each of these records would then have a smaller number of holdings, which would create the appearance of numerous, scarcely held works. This, in turn, would lead libraries to determine that particular title as being at risk and, thus, as a candidate for retention. This false scarcity is a bibliographic problem, but not a preservation risk since a larger number of copies are retained, albeit accidentally. However, it is a concern for the overarching goals of shared print archiving because it works against the efficiency and accuracy of these programs.

Second, and of more concern to shared print preservation programs, catalogers may erroneously attach holdings to an incorrect record. If different works or editions are erroneously attached to a given record bibliographic inaccuracies may cause an overestimation of the number of copies in existence. Such inaccuracies between the bibliographic record and the actual physical item can lead to libraries unintentionally dropping the number of retained copies below the acceptable thresholds.

Attaining complete certainty about the level of accuracy across the hundreds of millions of records in OCLC is, in practical terms, an impossible goal. Instead, our research sought to determine if the risks posed by bibliographic inaccuracy could be managed in the course of normal shared print activities, or if they presented a risk of sufficient scale and complexity that it might endanger the enterprise. Our research does not, therefore, seek to determine the absolute level of bibliographic inaccuracy across the collective collection. Instead, it evaluates whether bibliographic inaccuracy is frequent enough or severe enough to compromise shared print efforts. Our research used interlibrary loan data to assess where bibliographic

* The Partnership for Shared Book Collections formed in 2019 to support and promote shared print programs, and formed a Risk Research Working Group to help the Partnership make informed recommendations on creating responsible commitments. https://sharedprint.org/

inaccuracy falls on a spectrum of risk. We chose to analyze interlibrary loan data for our research for several reasons:

1. Data on fulfillment rates of ILL are already collected by many libraries, so our study could benefit from a large volume of data without requiring a high level of additional effort from participants.
2. ILL is a core library function. Therefore, participants could gain an immediate benefit from participation not only through assessing their own data, but also via comparison and benchmarking opportunities with other participants, regardless of the outcomes of the research project.
3. Evaluation of ILL requests against the item in hand resembles the activity that shared print participants perform when evaluating items for transfer to an archive facility or for withdrawal, thus making this a good proxy for the operational risk that needed to be evaluated.

Literature Review

The number of collectively owned copies is an integral variable in the calculation of determining the necessary number of copies to retain within both individual library collections and larger collective collections, as part of establishing sufficient and dependable access in conjunction with necessary preservation strategies.[4] The frequency of this topic in the literature suggests that the shared print community fully recognizes the importance of being able to make this determination. As shared print programs establish retention scenarios among participants, they strive to guarantee a minimum number of retained copies, typically dependent on criteria for both widely held titles, and scarce or unique holdings.[5] As one of the fundamental goals of ensuring continued access to print resources, overall sufficient numbers of copies need to be retained among the partners of shared print programs.[6] However, there is a prevailing element of uncertainty as to what, exactly, is a sufficient number—or optimal number—of copies that must be retained.[7] This uncertainty regarding what quantity would constitute the optimal number of retained copies was recognized in the early phases of the development of shared print programs[8] and has remained as a significant concern.

Several studies have emphasized that reliable data is needed to determine how many copies are necessary to retain and preserve to ensure enduring access and overall responsible stewardship of the print scholarly record.[9] Areas for which there can be insufficient data include: reliable discovery of print retention commitments or digital surrogates; levels of validation conducted verifying item ownership; types of storage environments used by shared print partners; and physical condition of the monographs partners have committed to retain. Although not commonly explored in the library literature, the margin of error in the bibliographic and holding records of shared print program participants is an essential element of the data required for proper retention quantity determination.[10]

Do We Own What We Think We Own?

Accurate bibliographic record data regarding what other libraries own is critical for libraries to have confidence about their own withdrawal decisions.[11] Teper included bibliographic inaccuracy, among other risk factors, as part of her study of seemingly identical monographs among a survey sample of 625 books. Teper found a 3.4% cataloging error rate exclusively due to edition inaccuracies through the use of an incorrect OCLC record.[12] Teper's findings may

skew higher for errors in editions because her study focused on books published between 1851 and 1922. During this earlier time, cataloging rules and practices were not standardized; efforts to determine what constituted quality cataloging and benchmarks to measure quality cataloging did not begin to emerge until the 1990's.[13] Teper found that factors other than bibliographic inaccuracy—such as item degradation—were more likely to be responsible for risk compromising access. It is important to note that, in contrast to our study, Teper's study of catalog record inaccuracy was based on examining the local catalog record alone, compared to the OCLC record. Our study furthers Teper's research by not limiting the publication year of the monographs studied and by directly comparing the item in hand to the corresponding catalog record. This methodology resulted in a bibliographic inaccuracy test more closely related to the processes used in validation and resource sharing request fulfillments, both germane activities to achieving important shared print program goals.

Accuracy of Bibliographic Records

The bibliographic database is core to any library's operations. Petrucciani stated that libraries are the only social institutions that are responsible for the "control, organization, communication, and preservation of information about the published output of human knowledge and expression."[14] Although Nero & He noted that academic libraries' cataloging departments are responsible for taking "ownership of the bibliographic integrity of the collection" in support of bibliographic record inspection,[15] it is unrealistic and unreasonable to think human errors do not occur. Additionally, there can be variances of cataloging records based on individualized library cataloging practices. However, most human errors and library cataloging variances do not hinder identification and retrieval. Therefore, the necessary quality and quantity of monograph bibliographic access points for a book in question to be accurately identified is maintained.[16] Bade noted that it is not necessary to have perfect catalog records but ones that provide sufficiently accurate identification information.[17]

The study of record errors conducted by Michaels and Neel found that their processes for relocating items to a closed stack location or facility functioned very effectively as verification of ownership. In their study, the bibliographic records were verified against each individually handled item resulting in "a 100 percent retrieval rate" for over 640,000 requested items over a 16 year period.[18] However, Michaels and Neel did find record error occurrences for items located in open stacks, although they applied a much broader interpretation for such errors than what we used for this ILL-based bibliographic inaccuracy study. For example, Michaels and Neel included circulation status errors as well as catalog record mismatches to physical items in their study, thus resulting in an overall 2.16% error rate. Taking into account only cataloging record errors, which included labeling and barcode errors, Michaels and Neel found a 1.42% error rate. Of all the various error types that Michaels and Neel studied, they acknowledged that not all of the issues "encountered would have equal implications for shared print initiatives."[19] In some cases, these record errors resulted in an item being more widely held than previously known, which leads to over-retention and reduces the risk of retaining a lower than acceptable quantity of a monograph title.

Bibliographic inaccuracy is but one of several variables, many others being more impactful, in determining and mitigating risk within shared print programs.[20] A recent model of how to determine the optimal number of copies includes a variable for bibliographic inaccuracy[21] and requires a default value for this variable to be entered. The dearth of published research

on bibliographic inaccuracy applicable to the shared print endeavor prompted us to undertake our own study to more clearly understand which instances of bibliographic error would lead to an incorrect conclusion of a library's ownership of an individual monograph. We intended that this research would provide a reasoned quantitative number to apply in the risk model tool for shared print programs mentioned above.

Methods

Through this study, we gathered data to further our understanding of two areas:

1. The frequency of occurrence, or percentage, of bibliographic mismatches for monographs.
2. Whether bibliographic mismatches, or inaccuracy, presents a significant risk in a collective collection, specifically the risk that copies may be incorrectly withdrawn.

To the best of our knowledge, interlibrary loan transactions have not previously been used to measure or study bibliographic inaccuracy. As noted in the introduction, we chose to use ILL data for this project for several related reasons:

- Ease of data collection: In the course of daily work, resource sharing staff look closely at the item in hand and compare it to the request. Through many resource sharing systems, like the service run by OCLC, the requests are normalized so that when staff are comparing books to the request, they are checking it against a record. Because we requested limited data that could be gathered and recorded relatively easily while carrying out existing daily library functions, the study did not require a high level of additional effort from participants.
- Data quantity: Because data on fulfillment rates of ILL are already collected by many libraries, our study benefited from including a large volume of data collected from diverse and geographically distributed participating institutions in a relatively short period of time.
- Applicability to shared print program management: The evaluation of ILL requests against the item in hand is similar to the activity that shared print program participants perform when evaluating items for transfer to an archive facility or for withdrawal. Because of this, we were able to leverage this data to assess risk of bibliographic inaccuracy and to apply it in a shared print context.

In short, by leveraging existing resource sharing workflows and keeping data collection efforts to a minimum, it was possible to maximize participation, to create a large data set of 29,630 items within a relatively short period of time, and to use this pool of data as a litmus test for the severity of mismatches.

The intention of our study's scope is to capture data related to issues that affect identification of duplicate monograph copies, rather than overall cataloging accuracy. For example, it is less important that subject headings be correctly listed or author names normalized. The deciding factor in our study was whether the difference in bibliographic data either caused confusion about the copy in hand or prevented a successful retrieval for fulfillment of a loan to a user. In other words, in practice, do the book and the information in the record sufficiently match?

Data Collection

Prior to beginning our research, we drafted a simple data collection form. We used this form to solicit feedback from eight resource sharing departments; several institutions also undertook

a three-day pilot to evaluate the proposed process. We initially considered an approach that required participants to capture categories of errors and source of request (such as WorldCat or a union catalog). After receiving feedback, we narrowed the scope to focus on capturing data that was most relevant to a bad retention outcome.

We then distributed a call for interest in participation to the Print Archive Network and ILL-L listservs, in addition to direct messages to eight libraries and consortia already engaged in shared print efforts. Respondents received an email with a brief project description and an invitation to a webinar on October 1, 2019. They were invited to submit suggestions for refining the study and questions at or in advance of the video conference, which also addressed the intent, process, and expectations of the study.

Participants then completed a brief registration form that included institution name, contact name, contact email address, and dates of study participation. They were asked to gather data for four to six weeks, completing their data collection by November 28, 2019. Fifteen libraries participated.

Participating libraries were asked to use a paper form to record two categories of mismatches: major (i.e., title or author, which may indicate an entirely different FRBR Work) and minor (i.e., edition, language, or form, which indicates a different FRBR Expression). Only requests that used full bibliographic records were included. Participants were also asked to record other issues they discovered along with a description. For mismatches, photos of the title and verso pages were encouraged, although not required (see Appendix for the description of the project provided to the participants, instructions to the participating libraries, and the form to use to record results).

Once all data was submitted, the research team reviewed each dataset for completeness and compiled the results. It bears emphasis that this study focuses on the ability of resource sharing staff to fulfill requests based on bibliographic data they receive and uses that information as a proxy for what shared print programs look for when comparing records. This is not a study of cataloging practice directly, but of the effects created by those practices and the way that environment shapes shared print retention decision-making.

Results

Out of the fifteen libraries that submitted datasets, thirteen were complete, valid, and comparable. From the thirteen sets of valid data, there were a total of 29,630 items reviewed during the study period.

Data from two libraries were not included in the results. One library's data contained useful information on matching accuracy but could not be used due to incomplete counts of total ILL transactions. It is impossible to calculate the percentage of mismatches between the OCLC records and the physical items without the total count of items analyzed. Another library captured data as books were sent to storage and not through their ILL process. While the data itself is valuable, it cannot be compared with data collected through ILL because the demographics of the books involved may be different from those requested through ILL transactions. Therefore, this library's data was not used in this study.

The initial interest of the research team was determining a rate of bibliographic inaccuracy. By all counts, bibliographic inaccuracies for items requested through ILL were low. Nine libraries (69%) out of a total of thirteen, reported no major or minor mismatches. These nine libraries reviewed 23,224 (78%), the majority of items in the study overall. The remaining

four libraries found 15 (0.05%) major and 14 minor (0.05%) errors, accounting for 0.10% of all items reviewed. It is possible that the libraries that found errors had more thorough review practices. To account for the worst-case scenario, we also calculated the error rates only within datasets that found at least one error. For the libraries that did find errors, major and minor errors accounted for less than half of one percent (0.45%) of the items that they reviewed.

TABLE 1
Results of Comparable Data from Participating Libraries

	# Errors	% of All Items (29,630)	% From Libs Reporting Errors (6,406)
Major Errors	15	0.05%	0.23%
Minor Errors	14	0.05%	0.22%
Total Errors	29	0.10%	0.45%

The four libraries that reported errors included varying degrees of details in their submissions. Our participating libraries had some differences of opinion as to what to include as a major versus a minor error; however examining the error descriptions show that the errors themselves rarely cause confusion about the item in hand. Even title or author differences may be more accurately described as variations rather than wholly different titles or authors.

Examples of Mismatches

Library #4 reported the following:

- Major mismatches
    - One error appears to have a variant title in the local 245 field. The OCLC record reports "The man who invented instant replay" in the 245 with an additional title in the 246 of "Instant replay : the day that changed sports forever." The local record has "Instant replay : the day that changed sports forever" in the 245 without a 246 at all.
    - There was an item with the opposite problem where OCLC's record appears to have a minor typo. The OCLC 245 contains "All hall to the archpriest" rather than "All hail to the archpriest" which is in the local record and the title page of the book.
    - Similarly, a different book appears to have an omitted word in the record, or a standardized title. Both the OCLC record and local record list "Prima che te lo dicano gli altri" (English translation: "Before the others tell you") in the 245 but the title page is written as "Prima che te lo dicano altri" (English translation: "Before others tell you").
    - One item appears to have a standardized author in the record. The 100 field is listed as "Hawdon, Sarah Elizabeth, 1851-1921" but the title page lists "New Zealander."
    - The last major error reported was a photocopied book that should have been noted in the record. While the title is correct, it understandably may have been confused for an original.
- Minor mismatches
    - Dates were a common issue for minor mismatches and were involved with five minor mismatches.
        - Four books were listed to have a variation of one or two years in the

date field.
    - » One of those four listed New York as the place of publication instead of Cambridge.
- For the fifth, 2018 was listed in OCLC, 2014 in the local catalog, but the book states that the edition was first published in 2015. The library reported that the record was "pulled in 2018 for copyright information but [they] can't find any proof that a 2018 edition exists."

Library #7 reported two major mismatches.

- Major mismatches
    - The first was that the OCLC record appears to have two ISBN numbers (905349040x and 9789053490402) though the book lists only one which has eleven digits instead of the required ten (90-53940-040-x). This ISBN has a typo, potentially confusing the staff member.
    - The other mismatch appears to be an author normalization. The record states "Johnson, A.B." as an author although in the book it is written as "Burt Johnson." It was submitted as a major mismatch because it was viewed as listing the first name of the author incorrectly.
- Minor mismatches
    - Both minor mismatches appear to be minor normalizations using initials for the first and middle names. The first case is A.V. Seaton in the record but Tony Seaton in the book (one of five editors). The other is written as Gurevich, Aron IAkovlevich in the record but A.J. Gurevich in the book.

Library #2 reported the following:

- Major mismatches
    - Seven major mismatches with no more detail than five were for title and three for author errors.
- Minor mismatches
    - They also reported five minor mismatches, two for edition and three for year errors.

Library #17 reported the following:

- Major mismatches
    - Responding library reported an incorrect ISBN in the record as a major mismatch.
- Minor mismatches
    - One item was reported as having an incorrect edition but the respondent wondered if it was due to an internal logic error with their Information Delivery Services instance.

Discussion

In analyzing the data sets received, we were surprised at how infrequently errors that would affect the shared print endeavor were found. Only four out of the thirteen libraries with valid results found either major or minor errors in their records. Additionally, among these four libraries they only found 29 major or minor errors. One can infer that the occurrence of such errors is rather low and the specific data supports this; the combined errors only accounted for 0.10% of all the items reviewed by all the participating libraries. The number of errors found is too small to break down further with any accuracy.

Of the four libraries that reported mismatches, the total number of items that were processed by each library during the survey period varied widely, therefore the percentages of

major and minor errors had corresponding variances. The number of items reviewed as part of the ILL process was, from lowest to highest, a total of 220 (library #7), 1257 (library #4), 1873 (library #13), and finally 3056 (library #17). By percentage, those libraries had error rates of 2.3% (library #7), 0.8% (library #4), 0.6% (library #13), and finally <.1% (library #17). However, the significant comparison is against the larger group as a whole, comprising a total of 29,630 records reviewed. This is in keeping with the evaluation of the occurrence of bibliographic inaccuracy, as it exists within the collective collection in the context of shared print collections.

The impetus of this study was to assess how often a bibliographic record would point to a different object than the one described in the record, causing confusion about duplicates held across institutions. Correctly identifying the number of duplicates is important for libraries that are trying to assess the risk of withdrawing copies, as well as for the shared print community because they assess the minimum number of copies that need retention commitments. Interpreting the results through the lens of this intended purpose may shed some more light and further refine the findings.

Only four of the thirteen libraries with viable results found mismatches. At first, it may appear odd that errors were concentrated in 30% of the participants; however, examining the errors found more closely may suggest an explanation. Two of the libraries, accounting for fifteen of the errors, reported details for their findings. Of these fifteen errors, eight of the records clearly are describing the item in hand without potentially pointing to another item or edition. Four of the remaining eight errors were reported for date discrepancies, all of which were within a year or two of the book in hand and none of which showed edition variations. These, more likely than not, are because of differences in copyright, publication, and distribution date rather than actually different editions. Overall, this leaves three errors out of the original fifteen errors that lead to practical differences between the item in hand and the bibliographic record.

It is possible that nine libraries did not find any errors because errors are exceedingly rare. Two of the libraries did not provide specific documentation about the errors found except for the base cause (e.g., date, edition etc.). If we were to remove the twelve errors that do not cause confusion about the book in hand the overall error rate reduces to 0.06%, or less than six instances in every 10,000 cases.

As noted previously, results of Teper's study[22] showed significantly higher error rates than what our ILL-based study demonstrates. An important difference between this study and Teper's is the age of the monographs analyzed. The books Teper studied were older and from a time when cataloging practices were less standardized; these books, therefore, do not reflect the bulk of ILL transactions. In contrast to a review of nineteenth century and early twentieth century monographs, our review of ILL data constitutes a study of far more current materials. This claim is substantiated by studies that show the preponderance of items requested through ILL have publication dates within the most recent one to two decades from the date of the ILL request.[23]

The differences in the findings of these two studies are significant in a shared print environment. The number of books published grew steadily from the early nineteenth century to the mid-twentieth century, at which point growth accelerated rapidly.[24] Therefore, the number of newer publications far outstrips the number of older ones in library collections.[25] Since the availability of resource sharing is core to shared print programs, the lower number of bibliographic mismatches in this population of newer publications is noteworthy.

An analysis of a large data set of bibliographic records further confirms the ILL study results. OCLC's Sustainable Collection Services (SCS) provided data from approximately 430 separate libraries. The SCS dataset represented approximately 205.5 million title counts. SCS found that a mismatch of either title or author of a book only occurred in an average of 0.12% (or median of 0.03%) of the 205.5 million title counts and that 0.6% of the records could not be validated with an OCLC control number. While the SCS reports offer insights into the occurrences of mismatches it lacks the component of a physical comparison. As ILL staff handles each requested item, a more precise validation process occurs to verify if the lending library indeed owns the exact book in question.

Finally, a further impetus for this study was the question of whether bibliographic inaccuracy impacts retention decisions. We considered the possibility that bibliographic errors create a false impression of scarcity. This is arguably good for preservation, since those apparently scarce titles may be retained. However, this is contrary to the goals of shared print programs to effectively and efficiently manage access to resources. ILL data helps to put this hypothetical scenario into context.

Conclusion

In general, the review of the data sets results in an overall low rate of bibliographic inaccuracies—specifically 0.10%, and no more than 0.47% in the most cautious reading of the data—of the total 29,630 items reviewed. Moreover, these instances of bibliographic inaccuracy rarely prevented identification of the correct item and fulfillment of the ILL request. The error rate number drops to less than six instances out of every 10,000 items, and most likely even less, when the errors are limited to only verifiable errors that point to a different item than what is actually in hand. Even limiting the data to only libraries that found any error, the error rate is still below 0.5%. These are relatively small error rates, although in the context of millions of items they can amount to a significant number of affected items overall.

Areas for Future Research

This paper examines instances of bibliographic inaccuracies from a collections perspective, specifically in the context of shared print retention programs. However, it does point to an area of additional research that would be of potential value, namely that of the examination of cataloging practices and current trends and how that relates to the overall issue of accuracy of bibliographic records. Although that discussion is outside of the scope of this paper, it presents the opportunity for future meaningful research. Additionally, a follow-up study that is not limited to the ILL-based study conducted for this paper could constitute another area of future valuable research. This would allow for further exploration of bibliographic mismatches to items in hand.

As shared print programs look to mitigate risk as part of the application of retention commitments, other related areas hold value for future research. As mentioned previously, we did not include in our analysis the information from the library that submitted data for books being sent to storage, as opposed to data from ILL transactions, due to the potential of substantially different book demographics between the two types of data sets. However, data from books sent to storage offers a compelling direction for continuing research on bibliographic inaccuracy. Exploration of instances of bibliographic inaccuracy discovered by shifting items to a storage repository could uncover some useful data as it relates to shared

print programs. Namely, it serves as a validation process that the library has confirmed that it indeed owns the item in hand because bibliographic records are often verified and corrected in the process of sending items offsite. This could result in a more comprehensive review of a much larger quantity of possible mismatches between record and book since total numbers of items relocated to storage facilities would typically outstrip the numbers of ILL requests within the finite time period our study covered.

The implementation of shared print programs may need to account for different bands of risk management based on various collections demographics. Although some subsets of the collective collection may require more rigorous validation than others, such as the nominal occurrences of bibliographic inaccuracies as uncovered in this study, these subset groups may ultimately allow for individualized targeted and effective retention efforts. We hope that the data presented here can assist shared print programs assess the risk of bibliographic inaccuracies, in particular in conjunction with the use of the optimal number of copies model.[26]

Appendix. Instructions to Participating Libraries

Monograph Bibliographic Accuracy Study

The Partnership for Shared Book Collections is a fledgling community that has formed to support and promote shared print programs. One of its initiatives is to make informed recommendations on creating responsible commitments. Shared print programs exist in an ecosystem and few operate totally independently. Libraries are often members of more than one shared print program.

A working group of the Partnership is trying to determine how many copies of a particular title should have commitments, either in a single program or in all programs, through an evidence-based process. There are several variables that are necessary in determining an adequate number of copies. One issue that has been raised several times is how much confidence can we have that bibliographic records match the objects they are supposed to represent. There is some speculation, especially with details like editions, that there may be a significant number of errors, attributable, for example, to recon project matching algorithms.

We have not found existing research in this area. In trying to find data, the prospect of partnering with resource sharing staff was raised, since they look closely at the records and items during their work. We have contacted a few resource sharing departments and from them have heard that staff do not find bibliographic errors at a high rate, which makes us optimistic that a few resource sharing departments may be willing to help us capture data about errors. If you are willing to help us out with a six-week study by capturing data as you lend items, please let me know. We hope to start the study in early to mid October and finish by Thanksgiving.

You can use the form on the reverse side of this sheet for books lent. Please provide:
Library name
Date you started recording errors
Date you stopped recording errors
The total number of requests for monographs you searched during this time period
Tick marks for each record/book discrepancy in the designated categories; total of tick marks

Photographs of the request and the title page/verso for books with mismatches are greatly appreciated but not necessary.

Please return completed forms and any images you create, along with any comments, to me at:

Library Name: _____ Date Start: _____

Contact Name: _____ Date End: _____

Contact email: _____

Total number of requests for monographs processed during this time span: _____

Place a tick mark in the box for a mismatch between the bib info on the request and the book in hand.* Only record one error per item, preference given in the order listed below:
Major Mismatch (title, author):

Minor Mismatch (edition, year, place of publication, publisher)

Other, tally and type (e.g. III - not on shelf,)
N/A

* Photographs of the request and TP/Verso are greatly appreciated

Acknowledgement

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Constant Change or Constantly the Same? A Historical Literature Review of the Subject Librarian Position

Duane Wilson

This paper provides a historical literature review of the subject librarian position. The subject librarian position was originally created to support patrons in specific subjects. Since the position's creation, a subject librarian's foundational duties have consisted of collection development, reference, instruction, and liaison. Though liaison work has received increased emphasis, the subject librarian duties have been remarkably consistent through time. "Subject specialist" or "subject librarian" have been the most commonly used titles for the position, though recently "liaison" has become more common. The subject librarian position has persisted because it provides an important human connection to the library and because it is flexible and adaptive to change. Subject librarian positions vary in different libraries because each adapts the position to meet their needs.

Introduction

Traditionally, libraries are the heart, intellectually and physically, of a college or university.[1] A library's prominent location on campus is symbolic of the centrality of the offerings it provides, including both scholarly and human resources that meet faculty and student needs. However, the technological revolution called into question the centrality of the library. Many have predicted the library's demise because many of its resources are available electronically. Budget cuts have put pressure on libraries to demonstrate their value.[2]

One of the most critical elements of a library is that it provides human expertise to assist its users with its resources.[3] For many years, much of the assistance that libraries provide has come in the form of subject librarians,[4] a position designed to connect the library's users to the library.[5]

Though at least one author identifies the foundations of subject librarianship in the learned librarians of the Renaissance,[6] most agree with Hay's[7] claim that the creation of the subject librarian position was the result of area specialist needs during World War II. Since that time, the position has proliferated and has been generally adopted by academic libraries.[8] Supporters and detractors have written about the benefits and drawbacks of the position of subject librarian.[9]

Over time, library scholars have specified definitions, titles, and duties for the subject librarian position, but there has been no apparent consensus as to what the position is and what

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it should accomplish.[10] Many authors and practitioners have noted a clear shift within subject librarianship from a focus on collection development to a focus on liaison work.[11] Another trend in some libraries has been to replace subject librarians with functional teams.[12] These functional teams are specialized groups that handle library tasks (such as collection development) for all subjects rather than having a specific individual handle multiple tasks for one particular subject.

In this literature review, I will examine the definitions and duties of subject librarians through time to show what has changed. I will discuss the historical use of titles used for positions roughly equivalent to the subject librarian position and discuss what these titles mean. I will also highlight some of the central debates of the subject librarian system. This view of the history of subject librarianship will help those in the librarian profession prepare for the future as libraries continue to adapt to ongoing pressures.

In this review, I will answer the following questions:

1. How have the definition, duties, and accompanying role of subject librarians changed over time?
2. How have the titles used for subject librarians changed over time? What might these changes signify?
3. How have changes in budget, technology, and higher education affected subject librarian organizations?

Methods

To answer these questions, I retrieved articles from three major databases and organized my findings into major time periods in library history.

Databases and Articles

A search of the databases Library and Information Technology Abstracts (a major library science database), Gale Information Science Database (another major library science database), and Scopus (a broad database that indexes articles from multiple disciplines) revealed many relevant articles. I used a general keyword search since there was no thesaurus term for "subject librarian" or "liaison librarian." The search terms included "academic librar*" (for library or libraries or librarian), "subject or liaison and librarian," "chang*" (for change or changes) "or evolution or history," and "role or job or position." I limited the terms "subject" and "liaison librarian" to the title field, which appropriately limited the number of results. I later added the terms "bibliographer" and "reference librarian." From the initial search efforts, I scanned the titles and abstracts of the articles for those that were most relevant to the topic and selected ninety articles for more detailed evaluation. I organized article citations in Refworks.

Because this paper's research questions are historical, I retained articles regardless of publication year. I retained articles that included a unique definition of subject or liaison librarianship, or a list of subject librarian duties, regardless of peer-review status. I excluded articles that only cited another established definition of subject librarianship. I also excluded articles that discussed evaluations, changes, or techniques related to subject librarians, but that were about unique library situations or those that were unrelated to the definition or duties of a subject librarian. These criteria eliminated thirty of the articles that appeared in my initial search results. I searched the references in overview articles directly related to the topic as well as highly cited articles as identified by Scopus. This resulted in the inclusion of

sixteen additional articles directly applicable to the topic. Though I carefully reviewed all of the selected articles, I only included the fifty-one articles and books cited in this paper in the references section.

I used a spreadsheet to organize and compare the definitions and duties of subject librarians found in the articles. I also created a coding system to label and sort the articles. This allowed me to tag articles with significant findings. I present the coded articles in this literature review along with summary charts of the definitions and titles of the subject librarian position over time.

Time Periods and Terms

I divided the articles into four time periods, characterized by major changes related to either subject librarians or the environment surrounding them. These time periods are as follows: early years (before 1970), establishment (1970–1999), technology revolution (2000–2010), and recent (2011–2024).

The early years (before 1970) includes the period of time when the idea of subject librarianship was forming. The articles written in this time period discuss creating subject librarian programs and why they would be helpful. In the establishment time period (1970–1999), articles begin to clarify the idea of the subject librarian and discuss the development and expansion of the position in libraries. Articles during this time also discuss problems with the subject librarian structure.

Though the internet was established in the 1990s, the true explosion of information that heavily affected libraries happened in the early 2000s, which period I term technology revolution (2000–2010). The changes that occurred during this time period, along with budgetary pressures, profoundly impacted librarianship and the subject librarian organization. In the recent time period (2011–2024), the internet has become more established, and librarians have started to grapple with new challenges. Many libraries have faced additional budgetary problems and cultural and organizational pressures that have affected the structure and duties of subject librarians.

The literature refers to the concept of a subject librarian as a subject specialist, subject librarian, liaison, or reference librarian.[13] I will primarily use the term subject librarian in this paper to describe the concept.

Limitations and Further Study

Most assessments of subject librarian programs did not meet the inclusion criteria for this review because they did not specifically discuss the definition and duties of subject librarians. Additional insights could be gained from reviewing these excluded assessments.

Findings

Early Years (Before 1970)

Crossley asserted that the idea of librarian subject experts had its roots in libraries of the Renaissance.[14] He claimed that subject librarians began to form in public libraries after World War I. Hay stated that Harvard began using a subject librarian system before the 1940s.[15] However, Hay and Crossley both argued that the subject librarian system began to be more commonly adopted during and after the 1940s. Hay asserts that World War II was the catalyst for this change because of the need for area-specific knowledge to support the war effort, causing

the US government to support the creation of area-specific studies in universities and their libraries. Prior to this time, libraries primarily organized their duties by function.[16]

The subject librarian position was created so that librarians could understand and meet the needs of their patrons who had specialized knowledge in particular disciplines. The idea of helping with collection development in the library was central to the position; however, the subject librarian largely supported and liaised with teaching faculty, who had primary responsibility for selecting materials.[17] The primary duties listed for subject librarians during this period were collection development,[18] cataloging and classification,[19] reference,[20] bibliography creation,[21] liaison duties,[22] and instruction facilitation.[23] Hay stated that, "by 1960 most major university libraries had some subject bibliographers,"[24] implying that the position had become common in larger libraries by this time.

Titles mentioned for the subject librarian during this period included specialist,[25] bibliographer,[26] learned librarian,[27] subject librarian,[28] and subject specialist.[29] The terms subject librarian and learned librarian emphasized the need for subject-specific knowledge,[30] while the term bibliographer emphasized the role of creating bibliographies for patrons.

Establishment (1970–1999)

In the 1970s and 80s, the subject librarian position was more widely adopted. By the 1990s, changes in the library landscape facilitated discussion around changes to the position. The responsibility for maintaining collections shifted from faculty members to subject librarians, with collection development and management becoming a central feature of the subject librarian position.[31]

As subject librarians became established, concerns related to their position developed. Dickinson provided a relatively comprehensive list of concerns:[32]

- Lack of definition for the position
- Poor reasoning for collection responsibilities
- Poor collection choices (in contrast to faculty selectors)
- Cost of employing subject librarians
- False nature of subject assignment (subject librarians were assigned to multiple areas, including those in which they were not experts)
- Elitism caused by the autonomy given to subject librarians

During the establishment period, authors did not explicitly state the benefits of the subject librarian position. This is most likely because they already understood the inherent benefits. Hay argued that the subject specialist position was adaptable to change and that libraries that did not adopt the position would provide lower quality service.[33]

During this period, several authors gave definitions of the subject librarian position. Each definition related to having responsibility for subjects, with some definitions mentioning the importance of subject knowledge.[34] All articles mentioned collection development as a duty of subject librarians,[35] with some stating the duty of helping faculty members maintain collections, while others stated that subject librarians performed this duty themselves. Reference, instruction, liaison, and bibliographic services were also frequently mentioned duties.[36]

In the establishment years, there were fifteen unique terms used for a subject librarian in the reviewed literature. "Subject specialist" was the most common; however, more than one author mentioned the terms "subject bibliographer," "bibliographer," and "reference bibliographer."[37] This proliferation of terms seems to reflect an uncertainty on the part of libraries as

to where and how subject librarians should be placed within the academic library. Each title provided a nuance that meant something different to the respective author.

Technology Revolution (2000–2010)

Though library automation started long before the proliferation of the internet in the late 1990s, libraries began to experience the full effects of the internet and its accompanying knowledge explosion at the beginning of the new millennium. In addition, substantial budget cuts were the norm as libraries were affected by broader trends in the world.[38] Libraries during this time period saw a steep decline in reference transactions[39] and a decline in the use of print-based resources.[40]

The advent of technology in libraries primarily changed collection development and reference. Subject librarians were now required to select electronic materials,[41] and reference desks became more and more obsolete.[42] Liaison duties also gradually became more prominent and more frequently mentioned in the literature.[43] Though changes were occurring to subject librarian duties, the changes were primarily in how duties were performed, rather than an addition or deletion of duties.[44]

Pinfield argued that the subject librarian position was successful because it was user-focused, which allowed subject librarians to be flexible and to "respond effectively to changing technologies, systems and expectations."[45] Gaston noted one benefit of the subject librarian position was that it provided an individual contact for users, and he suggested that the subject librarian organization paralleled the subject organization of the university.[46] Agyen-Gyasi emphasized the benefits of efficient use of professional expertise, collection development organized by subject, and the increase in librarian job satisfaction.[47]

Challenges listed during this period included changes in technology,[48] baby boomer retirements,[49] difficulty in recruiting those with sufficient subject background,[50] and the uneven performance associated with non-specific job descriptions.[51] The authors who mentioned these challenges believed that they could be overcome and that the subject librarian system was the best option for their libraries.

The subject librarian definition during this time period, offered by Agyen-Gyasi, was heavily focused on subject expertise.[52] Collection development was still the most frequently mentioned role among authors, though reference, instruction, and liaison were prominent and mentioned almost as frequently as collections.[53] Bibliographic services and cataloging were infrequently mentioned and were not as prominent roles during this period.[54] Though there were eleven unique terms used as titles for the subject librarian position in the articles from this time period, only the terms "subject librarian," "subject specialist," and "liaison librarian" were used more than once.[55]

Recent (2011–2024)

The pressures that began during the technology revolution continue through the recent time period. For some libraries, budgetary pressures were magnified in this time period, while for others the changing technology and university environments were more prominent. These pressures lead to changes, or at least discussion about changes, to the subject librarian position in many libraries.

One evidence of this shift was in the titles that authors use for the subject librarian position. In all previous time periods, "subject specialist" or "subject librarian" was most promi-

nent; however, in this period, the term "liaison" was most frequently used.[56] During, this time period eleven unique terms were used for a subject librarian, with the most common being "subject librarian," "subject specialist," "liaison librarian," "reference librarian," and "liaison."

Miller and Pressley identified challenges of the subject librarian position such as contacting faculty members, working with time constraints, and communication.[57] Other articles list concerns about training subject librarians to understand their role and value. Banfield and Petropoulos identified the key problems of the traditional liaison model as expense, lack of ability to replace those on leave, and lack of understanding about liaison responsibilities.[58] Miller and Pressley mentioned the benefits of the position as the ability to connect with people, provide a human face to services, and create relationships.[59]

Resnis and Natale provided good definitional clarity between the roles of liaison, subject specialist, and functional liaison.[60] They described the *liaison* as someone assigned to work with a university group, the *subject specialist* as someone with subject knowledge who was assigned liaison duties as a result, and the *functional liaison* as someone who specializes in a library function. Most other articles in this time period either did not discuss the definition of a subject librarian or focused on a liaison definition similar to Resnis and Natale's.

Despite the change in focus to liaison work, during this time period most articles leave the subject librarian duties largely unchanged, and almost all articles mentioned the same four duties: collection development, reference, instruction, and liaison work.[61] Kenney discussed a possible growing trend of separating collection development from liaison duties, allowing liaisons to focus on engagement activities.[62] Other duties the articles listed, such as scholarly communication and electronic guide creation, were simply extensions of the requirement of most subject librarian's subject assignments.[63]

The idea of functional specialists was discussed more frequently during this time period, and many libraries reported adopting the model.[64] In these libraries the subject librarians were replaced by functional teams that took on duties such as collection development, scholarly communication, and research support. Most articles stated that this system was adopted because of budgetary or environmental pressures.[65] However, Hoodless and Pinfield found that the primary purposes behind the change were consistency, efficiency, and alignment with university strategy.[66] Johnson claimed that most libraries were sticking with the traditional subject or liaison-based model even after investigating the functional model.[67]

Discussion

The definition of a subject librarian has not fundamentally changed over time. From Humphreys' original definition in 1967 to Resnis and Natale's definition in 2017, the consistent definition of a subject librarian is a librarian who has been assigned responsibilities within a specific subject or group of subjects (see Table 1). The main discrepancy over time of the definition of a subject librarian is whether subject knowledge is a critical part of the position. Some authors argue for the importance of subject knowledge,[68] while others argue that it is not necessary.[69]

Though many subject librarian duties have been included in the position through time, the core duties have remained stable. These duties, explained in more detail in the following paragraphs, include collection development, reference, instruction, and liaison.

Collection development—sometimes termed acquisition,[81] book selection,[82] collection building,[83] and purchasing decisions[84]—was originally the job of teaching faculty.[85] As the

TABLE 1
Definition of the Term Subject Librarian

Author	Year	Definition
Humphreys	1967	"A member of a library staff appointed to develop one or more aspects of a library's technical or reference service in a particular subject field. Although he would normally already have some experience in this field and would commonly have obtained a first or a research degree in the subject, it is not essential that he should have qualifications in the subject when he is appointed."[70]
Danton	1967	"An associate of the Library Association, with specialized knowledge of one or more subject fields."[71]
Holbrook	1972	"A subject specialist is a member of the library staff appointed to organise [sic] library services in a particular subject field. This subject field may be fairly narrow, or, more typically, be broad enough to cover an umbrella of related disciplines contained in a faculty/school/departmental structure."[72]
Smith	1974	"He is an expert in the bibliographical organization of a field of knowledge, and he utilizes this expertise to provide complex and needed services to a clientele."[73]
Feather and Sturges	1997	"A Librarian with special knowledge of, and responsibility for, a particular subject or subjects."[74]
Agyen-Gyasi	2008	"A professional librarian who has the requisite subject knowledge acquired formally, or has extensive experience working within a particular discipline. In fact, the title is not as important as the associated expertise; the key expertise being in-depth knowledge of a subject area and grounding in the principles of library use and organization."[75]
Resnis and Natale[76]	2017	Liaison: "A librarian who is assigned primary engagement responsibility to specific university department(s), program(s), and/or unit(s)."[77]
Resnis and Natale	2017	Subject specialist: "A librarian with additional knowledge in a specific cognate area, who is assigned liaison duties in-part based on that subject knowledge."[78]
Resnis and Natale	2017	Functional liaison: "A librarian who oversees a certain function of the Libraries' mission such as scholarly communication, digital scholarship, or student engagement. This involves interaction with a wide range of constituents, and often necessitates collaboration with subject-specialists."[79]
Palumbo et al.	2021	"Subject specialist is a librarian with specialized knowledge and experience to select materials and provide information literacy instruction and reference services to users in a specific subject area or academic discipline (or subdiscipline)."[80]

subject librarian position became more established, collection duties were turned over to librarians and eventually became the primary focus of most subject librarians.[86] However, as budgets shrank and electronic resources proliferated, collection development became a less prominent task for subject librarians.[87]

Reference has also been termed reader services,[88] assistance,[89] information service,[90] and inquiry work.[91] Prior to the 2000s, librarians would sometimes staff a reference desk.[92] But today the reference desk has become less prominent, and most subject librarians now provide reference services through in-person consultation, email, or phone.[93]

Library instruction has also been called bibliographic instruction,[94] user education,[95] information literacy instruction,[96] or teaching and learning.[97] Some articles use the term "one-

shot sessions,"[98] but library instruction is usually referred to as instruction or user education. Instruction typically differs from reference in that it represents a coordinated effort by a professor to have a librarian provide group instruction for a class.

Liaison work is also referred to as outreach and communication,[99] developing and fostering communication,[100] and engagement.[101] Multiple articles mention liaison work as the main duty of librarians through time.[102] Recently, this duty has become so prominent that some libraries have renamed the "subject librarian" position to "liaison" and centered all duties around the liaison aspect of the position.[103] Liaison duties have become more prominent as libraries recognized human connection as the most important feature of subject librarianship. Even before the shift to liaison duties in subject librarian positions, Gaston stated the following:

> It appears that subject librarians have always performed a liaison role between the library and its client group, the academic departments, and it is this role which distinguishes them from the other functional units within a library organisation [*sic*]. The liaison role may explain why subject librarians have survived a multitude of changes in both their working practices (such as IT) and the environment in which they work (such as changes in higher education). Writers who have defended the subject librarian system on the basis of its user focus (liaison) seem to have come closest to providing the elusive definition of what a subject librarian is.[104]

Gaston's opinion was prophetic: liaison duties have directed the development of the subject librarian position to the present. The liaison portion of the subject librarian job focuses on the benefits of connecting people with the library organization and its resources. Its autonomy and focus on the individual have allowed the subject librarian position to change, persist, and thrive even as budgetary issues, technology, and organizational restructuring have put pressure on libraries.

Other duties that were initially central to subject librarianship are no longer part of most subject librarians' duties. In the early years, subject librarians would perform cataloging and classification duties.[105] However, during the technology revolution period, cataloging and classifying took on a more consultative role; a subject librarian might work with a cataloger on subject-specific materials but would not typically perform original cataloging.[106] No articles in the recent time period mentioned cataloging as a duty of subject librarians.

Bibliography was another key duty of subject librarians at their origin. Unfortunately, this term is a bit confusing because it is used in many ways within the library literature. Historically, a bibliographer was someone who created bibliographies for patrons on the topics of their research.[107] However, the term was also used for collection development and for instruction.[108] Though making bibliographies is no longer a duty mentioned for subject librarians, the more technologically current duty of creating online guides to library materials has replaced it.[109]

Authors in all time periods included many other duties that subject librarians perform. However, these duties were less frequently mentioned, and most are subsets of the core subject librarian duties previously discussed. Recently, authors mentioned duties that relate to research support, such as scholarly communications, helping with disciplinary courses, assistance with data management, and citation analysis.[110]

One of the most confusing and challenging issues related to the subject librarian position is the large variety of titles by which this position has been—and continues to be—known.

Libraries have used titles to emphasize different parts of the role and how it is implemented in their library. By far, the most common title used has been "subject specialist" (see Table 2). The label "subject librarian" was often used as a companion to this term, though it was primarily used in the 1990s and early 2000s. The title "bibliographer" was used in earlier articles but is not used in recent articles. Liaison duties have become so central to the subject librarian position that many libraries have changed the title to "liaison librarian."[111] Overall, there are thirty unique titles (see Appendix) in the consulted literature that refer to a subject librarian or similar position.

Though authors mentioned different problems with subject librarianship, most of these problems were repeated throughout the literature. The concern that the subject specialist organi-

TABLE 2
Subject Librarian Titles

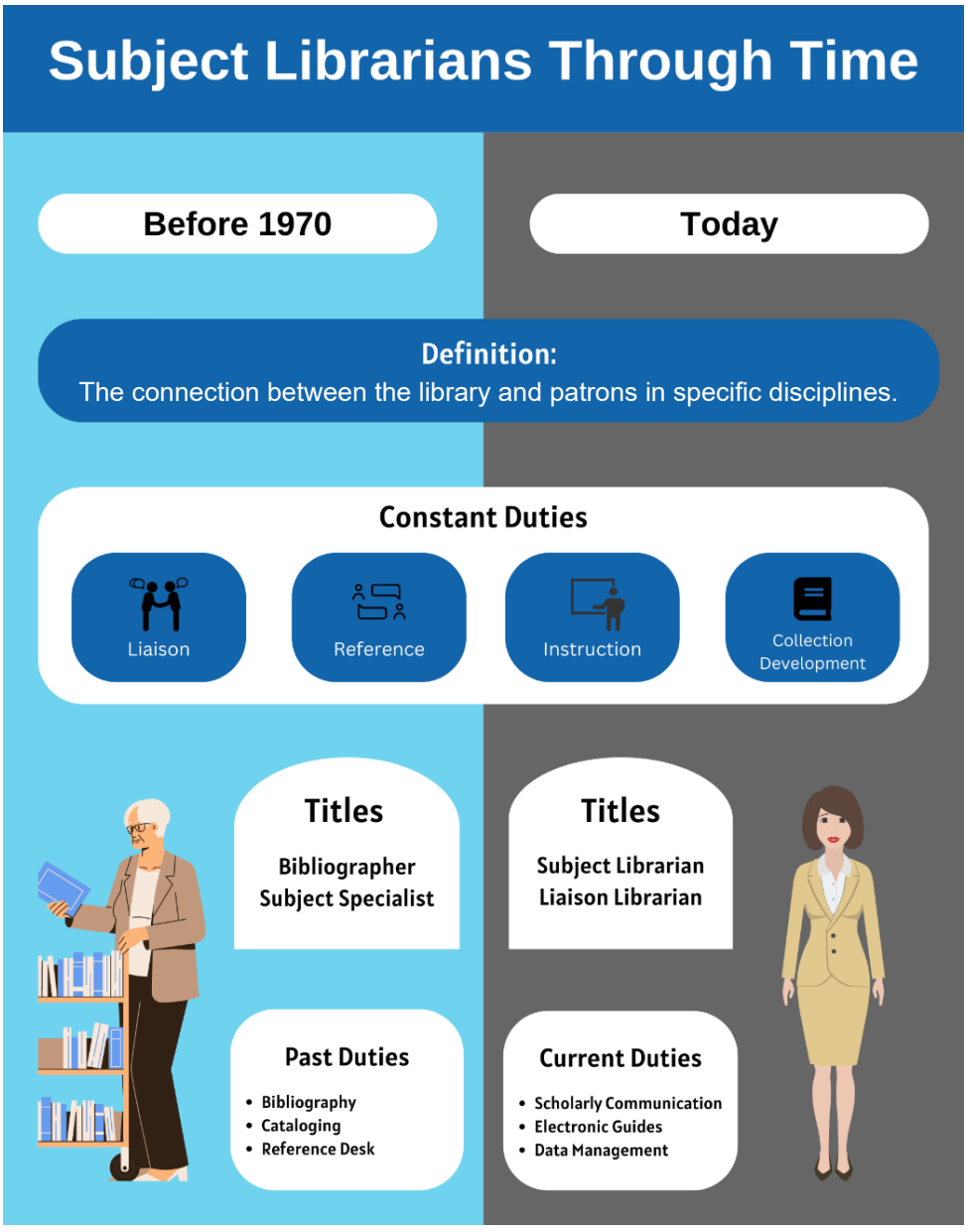
Author	Year	Bibliographer/ Subject bibliographer	Subject specialist	Subject librarian	Liaison/ Liaison librarian	Reference librarian	Scholar-librarian
Downs	1946		x				
Fussler	1949	x					
Byrd	1966		x	x			
Gration	1974		x				
Crossley	1974	x	x				x
Michalak	1976	x	x				
Dickinson	1978	x	x				
Hay	1990	x	x				
Latta	1992	x	x	x	x		
Gaston	2001		x	x			x
Pinfield	2001		x	x			
Rodwell	2001		x		x		
Feldman	2006			x			
Agyen-Gyasi	2008		x	x	x		
Rodwell and Fairbairn	2008		x	x			
Hahn	2009				x	x	
Miller and Pressley	2015				x		
Banfield	2017			x	x		
Resnis and Natale	2017		x		x		
Johnson	2018			x	x	x	
Kranich	2020		x		x		
Hoodless and Pinfield	2018			x			
Johnson	2020			x	x	x	
Chanetsa and Ngulube	2016			x			
Chanetsa and Ngulube	2017		x	x			
Count		6	16	13	10	3	2

This table only represents titles that were included by more than one author. The Appendix contains the full list of titles.

zation was expensive and hard to staff were some of the most frequently mentioned problems.[112] Authors discussed the difficulty of hiring subject specialists in certain disciplines that were not library focused.[113] Some authors stated that the subject librarian position provided a great deal of autonomy to the librarian, which made performance uneven between librarians and dependent on individual whims and interests.[114] Also, subject specialists often only specialize in one area, even though they are assigned multiple subject areas. Though advocates argue that knowledge in a similar subject is sufficient, detractors say this is evidence that subject knowledge is not needed.[115] Subject librarians are sometimes considered by themselves or other library workers as an elite class in the library,[116] which can cause conflicts among library staff members.

Most authors from the earlier time periods did not see any need to address the benefits of a subject specialist system. These benefits were obvious to them and seemed inherent in

FIGURE 1
Comparison Between a Subject Librarian Before 1970 and a Subject Librarian Today



the definition of the position. Later authors articulated the key benefit: that a subject specialist could provide a human face and a strong relationship with others in the library.[117] The subject librarian system mirrors the disciplinary organization of a university, which provides a natural means for librarians to relate to their constituents. Additional benefits of the subject librarian position from the literature included efficiency in working with faculty, a logical collection development organization, efficient use of staff, efficient reference, and job satisfaction.[118]

One aspect of the subject librarian analysis that is not well articulated in the literature is the difference in subject librarians based on country, language, and culture. Some articles discuss these differences,[119] but no through analysis has been performed. There does seem to have been a delay in the adoption of the subject librarian model in some African countries.[120] Overall, the trends in English-speaking subject librarian positions are similar regardless of location.

Though library size is occasionally mentioned in subject librarian literature, differences among subject librarian roles between large and small libraries is another area that has not been well explored. It appears that a full subject librarian model, where a large number of subject librarians are assigned a limited number of subjects based on their expertise, is primarily extant in large academic libraries. Medium and small libraries are more likely to make liaison assignments even if subject expertise is not present.

One of the most interesting trends in recent years has been the switch in some libraries to functional teams. As Hoodless and Pinfield point out,[121] this switch represents one of the only major organizational experiments that libraries have attempted recently. All other changes have been small variations of current models that ultimately amount to little more than window dressing. The great irony of this change to functional teams is that libraries were primarily based on function prior to creating the subject specialist model.[122] The recent movement towards functional teams was usually a reaction to budget problems, a result of organizational changes, or an effort to resolve problems within the subject librarian organization.[123] Libraries were typically satisfied when they made these changes. However, Johnson claims that most libraries that investigate functional teams choose to retain the subject-focused organization.[124]

Implications

The fact that the subject librarian position has remained fundamentally the same through time is a key to thinking about the subject librarian position for the future. People feel most comfortable working with a specific individual that they can contact rather than having to understand the entire library organization. This fact has helped make the subject librarian position successful and should remain the focus of the position. Alternative organizations, such as functional teams, eliminate this single contact which eliminates the key human face of the library. Such alternative organizations should be approached cautiously to make sure that patrons aren't intimidated with multiple contacts in the library.

Subject knowledge or assignment has been the key definition of a subject librarian through time. However, the move toward the liaison function being central makes these definitions largely obsolete. The importance of a contact for patrons is more important than subject knowledge. The increasing use of liaison as the title for the position underscores this emphasis. Libraries should consider focusing on the liaison function of the position rather than subject knowledge.

The core duties of subject librarians have remained constant through time, though the emphasis on different duties has changed and there have been subtle changes related to tech-

nology and changing library and campus priorities. In many organizations, this collection of duties has been very successful and libraries should think carefully before removing or experimenting with different subject librarian duties.

To more adequately describe the current subject librarian position, I offer the following definition, which is similar to—but more expansive than—the liaison definition of Resnis and Natale:[125] *A library employee who is assigned to work in a liaison role with individuals on campus in specific subjects. They should have adequate knowledge to understand and meet the needs of those to whom they have been assigned. They should play a key role in library collections so that they have an in-depth knowledge of library resources and quickly understand and meet the resource needs of those to whom they are assigned. Because of their understanding and expertise, library instruction and reference are a natural outgrowth of their assignment. They should have an understanding of other important library initiatives so that they can assist those to whom they are assigned with those initiatives*.

The subject librarian position has persisted and remained strong through time despite dramatic changes in technology, budget cuts to libraries and the institutions they support,[126] as well as other shifts in the higher education landscape. It has persisted because it is flexible and adaptive to the needs of both the library and the individuals that it serves.[127] As a result, the subject librarian organization is prepared to adapt to and meet the needs of the library and its users for many years to come.

When some authors commented on the variety of organizational systems related to subject librarians, they came to the conclusion that libraries should do whatever works best for them.[128] This conclusion is an acknowledgment that each library is unique. The issues of size, budget, and university organization affect each library differently, and the subject librarian model has been modified to meet library needs. If the subject librarian model was not adaptable, then it would not have been employed by so many libraries. So rather than attempting to create an elusive single standard, the organization of a subject librarian should be adapted and personalized to meet the unique needs of each library.

Conclusion

Through this historical analysis of the literature a clearer picture of the subject librarian emerges. The subject librarian model was created to provide a human face to the library.[129] It was created because libraries needed to provide services based on subject expertise and because university faculty members needed help with collection development.[130] More recently, as budgetary pressures emerged and libraries adopted technology, the focus of subject librarians has shifted to focus even more on connecting with patrons. Because of the flexibility and importance of the subject librarian position, it has persisted and thrived despite pressures and changes over time.

Because of the differences in size, budget, collections, and focus among libraries, each library has, and will continue, to use variations on the subject librarian model to meet the needs of its patrons and its university. Most likely, these variations of the model will focus on liaison duties, because human connection is preeminent to the success of libraries. Though some libraries may move towards functional teams as a replacement for the subject librarian model, functional teams create the same problem that the subject librarian position was created to overcome. Especially in larger libraries, having a person who can connect with patrons, especially with professors, is vital to meeting the needs of library constituents.

Appendix: List of Subject Librarian Titles

- Academic librarian
- Area bibliographer
- Area librarian
- Area specialist
- Bibliographer
- Faculty liaison librarian
- Information librarian
- Information specialist
- Learning support librarian
- Liaison
- Liaison librarian
- Librarian
- Librarian selector
- Link librarian
- Personal librarian
- Professional specialist
- Reference bibliographer
- Reference librarian
- Research librarian
- Scholar-librarian
- School librarian
- Selector
- Specialist
- Subject area specialist
- Subject bibliographer
- Subject consultant
- Subject librarian
- Subject selector
- Subject specialist
- Subject support officer

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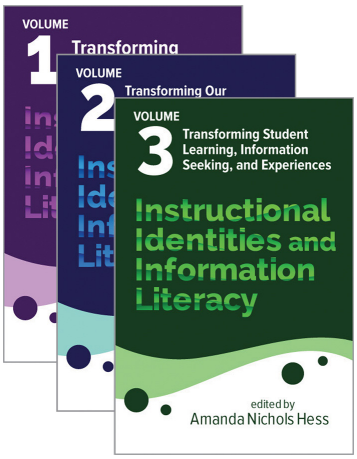
Instructional Identities and Information Literacy: Transforming Student Learning, Information Seeking, and Experiences, Volume 3, Amanda Nichols Hess (ed.), ACRL, 2023. 200p. Softcover. $65.00. 9780838939468. (Review 3 of a 3-volume title)



Transforming Student Learning, Information Seeking, and Experiences is the third and final volume of *Instructional Identities and Information Literacy*. Edited by Amanda Nichols Hess, the Coordinator of Instruction & Research Help at Oakland University Libraries in Rochester, Michigan, this last installment wraps up the series and centers on students in the library and classroom. Included articles turn the spotlight on the experiences of academic librarians in a variety of environments and the ways their instructional identities are entwined with student learning and information literacy. Hess explains that this last installment was not originally part of the envisioned work, but ultimately evolved organically as submissions were presented to the editor which demonstrated the need to expand the series.

Transformative learning theory is the foundational pedagogical theory used throughout all three volumes. For those unfamiliar with Jack Mezirow's transformative learning theory, Hess briefly outlines the principles to provide readers a background before delving into each volume. Contributors then share their own practices and observations from the classroom, often altering their own attitudes and mindset to bring about an improved student learning experience.

Like the first two volumes, this third volume in the *Instruction Identities and Information Literacy* is broken down into multiple parts with three sections consisting of multiple essays describing the authors' varied experiences in transformative learning theory as applied to information literacy instruction. The sections are divided into: "Professional Dispositions and Preparatory Work," "Pre-College and First-Year Experience," and "Discipline-Grounded Learning Experiences." Each section contains four to five chapters that apply theory to specific classroom settings. Actual practices can be adapted and adjusted to fit other learning environments making this a useful guide for librarians developing their own instructional identities.

"Professional Dispositions and Preparatory Work" consists of four chapters dedicated to dissecting "specific professional dispositions or mindsets" (pg. ix) as they relate to information literacy instruction and transformative learning theory. Chapters in this section include stories reducing information bias, the use of reflective teaching, the role of shared learning outcomes, and servant leadership. One of the key takeaways from these articles is that strategically planning one shot lessons, building activities that develop student reasoning, and introspective evaluation of one's own teaching practices can all lead to improved learner experiences.

Part 2, "Pre-College and First-Year Experience," looks at program planning for pre-college students as well as those in their freshman year. Chapters include the topics virtual information literacy skills, first year experience, and composition. Academic librarians who build partnerships with school librarians can better prepare students for their transition into college. Furthermore, universities who value information literacy would be well-served by offering required,

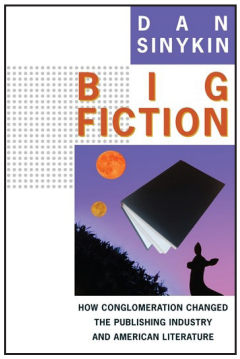
credit-bearing library research classes to freshman students, not only enhancing their critical thinking skills, but also potentially developing students' confidence and leadership abilities.

"Discipline-Grounded Learning Experiences" is the largest section and covers experiences within specific disciplines in the academic institution. Authors discuss using role playing to teach history, the value of tertiary sources in the humanities, information seeking within STEM, the use of an asynchronous virtual lab, and integrating active learning into library instruction. Building on basic knowledge and reference resources, students can expand their literacy skills in order to utilize them throughout their college tenure as well as into their future careers.

Throughout the three parts of this volume and across the chapters, authors integrate and apply transformative learning theory into their own practices often redefining the classroom and ultimately changing their own instructional approaches. This pedagogy is used with multiple other tools, theories, and practices to increase the value of library instruction, some of which include the ACRL *Framework for Information Literacy for Higher Education*, the Association of American Colleges & Universities Information Literacy VALUE Rubric, the Dunning-Kruger Effect, *Writing as a Mode of Learning*, and Cranton and Carusetta's five-faceted model of authenticity. The wide variety of pedagogy, tools, and practices can have transformative learning theory applied to them which demonstrates its applicability to the practice of information literacy instruction.

Paired with the first two volumes (*Transforming Ourselves* and *Transforming Our Programs, Institutions, and Profession*) in the *Instructional Identities and Information Literacy* series, *Transforming Student Learning, Information, Seeking, and Experience* would be a welcome addition in the collection of any academic librarian, especially those with a focus on information. This would also make a great set for the circulating collection of any college or university with an Information, Library Science, or Information Literacy degree program. The experiences shared in all three of these volumes are valuable to those working in the academic library field, especially given the lack of classes dedicated to teaching and pedagogy in most college programs which can leave many academic librarians feeling unprepared for one shot lessons or research consultations. Reading about a wide variety of experiences and results can help those in librarianship, both novice and experienced, to find their own instructional identity. *—Stephanie Cicero, Interim Library Director/Research and Instruction Librarian Roberts Wesleyan University*

Big Fiction: How Conglomeration Changed the Publishing Industry and American Literature, Dan Sinykin. Columbia University Press, 2023. Softcover, $30.00. 9780231192958



Big Fiction: How Conglomeration Changed the Publishing Industry and American Literature brings fresh analysis to fiction publishing in the United States. As an English professor with an appointment in quantitative theory and methods, as well as co-founder of a collective focused on post-1945 literary and cultural data, the author Dan Sinykin is uniquely positioned to produce this ambitious work of literary history. *Big Fiction* centers on conglomeration—the corporate trend of acquiring companies across industries—and the impact this business practice has had on fiction publishing in the United States from the 1960s to present. In a seemingly flurry of consolidations and take-overs within a short amount of time, the publishing industry transformed from being relatively small, privately held businesses to those same small publishers being gobbled up by large corporations in spite of antitrust laws (p. 5).

Sinykin considers both the arguments for, and the criticisms of, conglomerate consolidation in publishing; he pulls together the gamut of responses into a detailed illustration of conglomeration's dynamic and transformative impact across all corners of the industry's ecosystem. The book's chapters are divided by publishing sector. The primary focus is on the mass market and trade sectors; the book includes the nonprofit and independent spheres to a lesser degree. Across sectors, Sinykin identifies the beginning of the shift towards corporations accumulating smaller companies within publishing such as the purchase of New American Library in 1960 by the news organization, Times Mirror, followed by a landslide of additional mergers and acquisitions across the industry (p. 5).

Proponents argue that publishing conglomerates operate as a formal, corporate business bringing all the fragments together under one entity—authorship, acquisition, editing, printing, and marketing—while making the process easier to manage as well as more profitable (p. 12). However, the superorganism of the conglomerate is motivated by risk management and profitability; it secures its input from a number of stakeholders including editors, marketers, literary agents, distributors, bookstore chain buyers, critics, and business analysts (p. 12). Sinykin challenges the popular misconceptions of authors as solitary figures and nonprofit and independent publishers as free agents, operating separately from conglomerate publishing. He claims that large publishing houses encourage the myth of the solitary writer as an appealing fiction which actually obscures the more nuanced reality of conglomerate authorship. The book gives voice to the stories of many such individuals whose influence was and is widespread in the publishing industry but whose names are largely unknown in their role outside of writing.

Big Fiction also examines larger societal trends and their impacts on conglomerate authorship across time and sector. Such forces include the increased prominence of the social sciences, multiculturalism, creative writing programs, literary prizes, sexism, postmodernism, and technology. The author highlights several technologies, such as television, computers, the Internet, and BookScan (a data tool for tracking book sales), charting their influence on fiction publishing. For example, BookScan enabled publishing houses to consider the historical profitability of comparative titles when making acquisition decisions, which remains a common practice across the industry (p. 67).

Sinykin concludes with a nod to the future, highlighting recent and contemporary trends within the publishing space, such as the prominence of ebooks, audiobooks, social media, labor strikes, and DEI priorities. For example, the author examines a selection of industry up-and-comers and identified trends in publishing, such as the amplification of underrepresented voices as a common value across the group and the acknowledgment that books can eliminate borders and bring readers from diverse cultures together regardless of geopolitical barriers (p. 221).

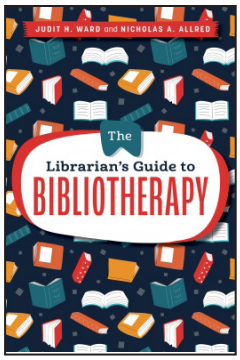
Big Fiction presents well-supported arguments for the significant—yet somewhat intentionally camouflaged—influence of conglomeration on American fiction, providing even-handed representations of the wide-ranging opinions about publishing's failings and triumphs from the past and present. Sinykin builds on previous publishing history as well as his own analyses. He incorporates a wide range of additional sources including first-person accounts from industry insiders, authors, biographical sketches, literary criticism, and trade journalism (e.g. *Publishers Weekly* content). The book's narrative is not only informative but fascinating, full of intriguing industry vignettes, such as one about a prominent author saving the hat

that another author wore to his Pulitzer Prize ceremony with the anticipation of wearing it in the same circumstance one day in the future (p. 87), and another about a bestselling literary fiction author and industry insider both advocating for black authors and being treated like a "race traitor" by some black editors (p. 112).

Because the book is organized by publishing sector rather than chronology, Sinykin repeats some pivotal events to provide historical touchstones, such as Random House firing long-reigning president Robert Bernstein in 1989 and, soon after, André Schiffrin, another company stalwart. Despite this useful convention of orienting milestones, the inclusion of a timeline with the book's end matter, along with the existing glossary of publishing figures, would have provided readers with an additional tool to help place the industry's complex history in time and context.

Overall, the book is highly recommended for academic libraries supporting American studies, history, and literature researchers. The author provides an illuminating and riveting examination of American fiction publishing and challenges the reader to look closer at oft-repeated assessments within the field. The book also creates a strong foundation for future works to further expand on areas that Sinykin either deliberately omitted (such as non-fiction and international fiction publishing) or trends that are still very much in the process of emerging. *—Marilyn Reside, Electronic Resources Librarian, CUNY Graduate Center*

The Librarian's Guide to Bibliotherapy, Judit H. Ward and Nicholas A. Allred, ALA Editions, 2024. Softcover. 224p. 9780838936627. $49.99.



Avid readers know the feeling of being emotionally affected by books, of seeing their experiences reflected in a way that helps them reach greater understanding, or of encountering new perspectives that help them cultivate empathy. Books can bring readers solace, inspiration, guidance, and even wisdom. The insight at the core of bibliotherapy is that these benefits are not confined to chance, private encounters between individual readers and their books. By choosing texts intentionally, providing context, or asking thought-provoking questions, clinicians can guide patients in deriving therapeutic value from the experience of reading.

Replace "clinicians" with "librarians" and "patients" with "patrons," and some aspects of bibliotherapy can be implemented in a library setting. Of course, bibliotherapy as a library service absolutely should not be confused with bibliotherapy as a treatment approach in a clinical setting. Librarians are rarely qualified, to say nothing of licensed, to practice mental health care, and an enriching library program is not an adequate substitute for formal counseling (51). The authors are careful to emphasize this distinction to the librarians who read this guide. Likewise, librarians offering bibliotherapy-informed programing should take similar care to communicate the distinction to their participants.

But with that caveat firmly in place, Ward and Allred argue that librarians possess many bibliotherapy-adjacent abilities already (xvi). Librarians who answer reference questions or perform readers' advisory are skilled in using their collections to meet their patrons' intellectual and recreational needs. Implementing bibliotherapy-informed programming entails concentrating instead on patrons' emotional or therapeutic needs, but significant parts of the experience transfer. The authors use the term "accidental bibliotherapists" to refer to librarians whose work sometimes includes helping patrons find reading material that might serve

a therapeutic purpose—books about addiction and recovery or navigating family challenges, for example. Their goal with this guide is to help "accidental bibliotherapists" become "*intentional bibliotherapy-informed librarians* [emphasis added]" (8).

Ward is a science librarian at Rutgers, the State University of New Jersey, and was previously director of information services at the Rutgers Center of Alcohol Studies. In that role, she developed the bibliotherapy-inspired "Reading for Recovery" program. Allred is a visiting assistant professor of English at Fairfield University in Fairfield, Connecticut, and has extensive experience collaborating on bibliotherapy-inspired projects. Five short sections of the book are credited to other contributors.

The book is organized around the stages of planning, conducting, and marketing bibliotherapy-informed programs. The authors describe multiple possibilities, such as passive programming (i.e., book displays, social media posts, and recommended reading lists) as well as active programming (i.e., one-on-one reader's advisory or large group events). The authors provide advice on selecting the techniques and formats that are most likely to reach a given group of patrons—for example, deciding which events would be more successful in person and which should be offered virtually. The introduction recommends mining the book for relevant guidance, rather than reading it cover-to-cover, and its organization facilitates that approach. Individual chapters don't quite stand alone, but readers with specific goals in mind will be able to find applicable sections without necessarily reading the entirety by referring to the book's index.

Many of the practicalities of planning and marketing bibliotherapy-informed events will be familiar to librarians who have organized and hosted other large group events. One of the book's strengths is that it contains several detailed tables distinguishing between bibliotherapy and other types of library programming. For example, the chapter "Setting Up Bibliotherapy-Infused Programs" identifies six aspects in which traditional book discussion groups and bibliotherapy-centered programs differ. While the goal of the former is to "discuss a book, story, or text for pleasure during the session," the goal of the latter is to "reflect on texts for individual therapeutic benefits after session" (82).

Choosing books that are likely to yield "the salutary effects of reading on mental health" (3) is pivotal to any successful bibliotherapy-informed programming. The book describes working with a few specific texts although detailed discussion of a large number of titles is beyond its scope. However, it does recommend other published guides that delve into possible resources. It also contains guidance on selecting materials and matching books to their intended audiences, including outlining how choosing books for bibliotherapy differs from choosing them for other purposes.

Although the authors developed their own bibliotherapy-informed programs in an academic library setting, the *Librarian's Guide to Bibliotherapy* is likely to be of value to public libraries as well. The book is recommended for anyone who is new to bibliotherapy and interested in practical guidance on a variety of approaches. —*Molly Strothmann, Professor, Library Collections Strategist, Oklahoma State University*