Environmental Scan 2017

By the ACRL Research Planning and Review Committee

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ACRL 2017 Environmental Scan

Introduction

Every other year the ACRL Research Planning and Review Committee publishes a scan of the higher education environment with a focus on implications for academic libraries. The 2017 Environmental Scan builds on last year's Top Trends in Academic Libraries[1] and the 2015 Environmental Scan,[2] which discussed other notable topics of interest to the academic librarian community, including student success measurements and open educational resources. Therefore, we have chosen not to repeat those topics in this year's data. The topics discussed and reviewed in this year's Environmental Scan include higher education funding and costs, enrollment trends within higher education, evidence-based decision making in academic libraries, information literacy issues, competency-based education, digital preservation, open science, open data, curating research data, scholarly communication issues, open access and collection management trends, collection assessment and evaluation trends, research evaluation and metrics, planning and designing library spaces, and social justice issues related to libraries and higher education.

Higher Education Funding

The data collected for the Grapevine report on state fiscal support for higher education "show an overall 4.1% increase in state fiscal support for higher education from Fiscal Year 2015 (FY15) to Fiscal Year 2016 (FY16)."[3] However, that modest increase comes after many years of cuts following the 2008 recession. According to The Pew Charitable Trusts' data, while federal spending on higher education has increased in recent years, state spending on public higher education has decreased since the Great Recession.[4] The changing balance affects the operation of institutions of higher education, since the "federal government mostly provides financial assistance to individual students and funds specific research projects, while states typically fund the general operations of public institutions."[5] Analysis compiled for the Young Invincibles' 2016 State Report Cards "shows that states have cut per student spending by 21 percent between fiscal years 2008

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[1] ACRL Research Planning and Review Committee, "2016 Top Trends in Academic Libraries: A Review of the Trends and Issues Affecting Academic Libraries in Higher Education," *College & Research Libraries News* 77, no. 6 (June 1, 2016): 274–81, http://crln.acrl.org/content/77/6/274.

[2] ACRL Research Planning and Review Committee, "Environmental Scan 2015" (Chicago, IL: Association of College & Research Libraries, March 2015), http://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/whitepapers/EnvironmentalScan15.pdf.

[3] "Annual Grapevine Compilation of State Fiscal Support for Higher Education Partial Results for Fiscal Year 2015-2016" (Center for the Study of Education Policy at Illinois State University and the State Higher Education Executive Officers (SHEEO), 2016), https://education.illinoisstate.edu/grapevine/Grapevine_FY16_Press_Release.pdf.

[4] "Federal and State Funding of Higher Education: A Changing Landscape" (Washington, DC: Pew Charitable Trusts, June 2015), 1.

[5] Ibid., 3.

through 2014. While many states have begun to reinvest in the past few years, only two states spend as much as they did before the recession (Alaska and North Dakota)."[6] Alongside this development, "tuition and fees at both 4-year and 2-year institutions rose 28 percent since the last recession."[7]

A recent study from the Center on Budget and Policy Priorities (CPBB) describes a similar educational environment, where "states have slashed higher education funding" and "the price of attending public colleges has risen significantly faster than the growth in median income.[8] Budgets for higher education institutions are still below pre-recession levels, tuition continues to rise, and enrollment continues to rise. However, "because tuition increases have not fully compensated for the loss of state funding, and because most public schools do not have significant endowments or other sources of funding, many public colleges and universities have simultaneously reduced course offerings, student services, and other campus amenities,"[9] as well as increasing the student-to-faculty ratio on average nationwide."[10] Increasingly, costs are shifted to the students, harming especially low-income students. Federal grants have increased, but since they do not cover the full cost of college, including room and board, students still borrow, increasing both the number of students in debt and the size of the average debt.[11] Pew and the CPBB both have recommendations to improve the situation, but all involve spending more money on higher education, even though "nearly every state has shifted costs to students over the last 25 years."[12]

Implications

- ☐ Increasing enrollments and stagnant budgets will undoubtedly affect budgeting and staffing decisions in many public colleges and universities.
- ☐ Further cuts to library budgets could affect everything from collections budgets or lead to academic libraries hiring more part-time workers, as many colleges have done via adjunct faculty.
- ☐ Libraries could experience downward pressure on starting salaries and the replacement of retiring and resigning staff with entry-level librarians and paraprofessional staff.
- ☐ Increasing student-to-faculty ratios could provide opportunities for libraries to market instructional and research services to faculty who might welcome the assistance in light of increasing workloads.

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[6] "2016 State Report Cards" (Washington, DC: Young Invincibles Student Impact Project, January 2016), 6, http://younginvincibles.org/wp-content/uploads/2016/01/YI-State-Report-Cards-2016.pdf.

[7] Ibid., 7.

[8] Michael Mitchell, Michael Leachman, and Kathleen Masterson, "Funding Down, Tuition Up State Cuts to Higher Education Threaten Quality and Affordability at Public Colleges" (Washingtion, DC: Center on Budget and Policy Priorities, August 15, 2016), 1, http://www.cbpp.org/sites/default/files/atoms/files/5-19-16sfp.pdf.

[9] Ibid., 14.

[10] Ibid., 15.

[11] Ibid., 16–17.

[12] Ibid., 16.

Higher Education Cost

Trends in Tuition and Fee Rates

The 2016 presidential election brought the cost of higher education to the forefront of many Americans' minds as the merit and plausibility free college tuition and rising student debt become platform issues. According to The College Board's *Trends in College Pricing 2016*, "the rate of growth of published tuition and fees is not accelerating over time."[13] Rather, published tuition rates increased slightly less in 2016-17 than the year before, and they have shown a slower rate of increase between 2006-07 and 2016-17 than was seen for two decades prior. The recession period between 2008-09 and 2012-13 saw a 28% increase in average tuition and fees, but "as the economy has recovered, state and local per-student appropriations have risen and tuition increases have slowed considerably."[14] However, the rate of increase remains higher than inflation and outpaces growth in incomes, which may contribute to greater affordability concerns for enrolling students and their families.[15]

The latest Integrated Postsecondary Education Data System (IPEDS) provisional data, published in November 2016, shows that tuition and fees for "full-time, first-time degree/certificate-seeking undergraduates" has shown a general trend of increase between the 2013-14 and 2015-16 academic years.[16]

Although for-profit institutions saw a very slight decrease (less than 1%), a price increase of about 4% was the norm among public and private nonprofit institutions, for both in-state and out-of-state students.[17] Prices for *in-district* students—that is, "a student who lives in the locality surrounding the institution, such as county"[18]—were slightly lower than in-state prices at 4-year institutions, but rose by the same percentage as in-state prices. At 2-year institutions, however, the difference was more noticeable: prices for in-district students only rose by 4.9%, versus a 5.4% increase in prices for in-state students.

More recent data on published tuition and fees charges for 2016-17 are available from The College Board's Annual Survey of Colleges. For full-time, in-state undergraduates, The College Board's data show an average price of $9,650 at public 4-year institutions and $3,520 at public 2-year institutions. Compared to the same data reported for 2015-16,

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[13] The College Board, *Trends in College Pricing 2016*, (2016), 7, accessed January 2, 2016, at http://trends.collegeboard.org.

[14] The College Board, 24.

[15] The College Board, 3.

[16] Scott A. Ginder, Janice E. Kelly-Reid, and Farrah B. Mann, *Postsecondary Institutions and Cost of Attendance in 2015-16; Degrees and Other Awards Conferred, 2014-15; and 12-Month Enrollment, 2014-15: First Look (Provisional Data)* (NCES 2016-112rev), U.S. Department of Education, (Washington, DC: National Center for Education Statistics, 2016), 3, accessed January 2, 2016, at https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2016112rev.

[17] More specifically, the average full-time, in-state price at 4-year public institutions rose by 4.1% from $7,819 (2013-14) to $8,141 (2015-16), while the average full-time, in-state price at 2-year public institutions rose a bit more, by 5.4%, from $3,738 (2013-14) to $3,941 (2015-16).

[18] Ginder, Kelly-Reid, and Mann (2016), 5.

this equates to price increases of 2.4% and 2.3% respectively, which does indeed suggest a slowing rate of increase. Regardless of the specifics of data collection, there is agreement that the rate of increase is in tuition is slowing but still outpaces tuition.

Average prices aside, the variation in actual tuition and fees between institutions is significant: although "37% of full-time public four-year undergraduates, including both in-state and out-of-state students, were enrolled at institutions with published tuition and fee levels between $6,000 and $8,999" in 2016-17, another 3% of these students faced lower prices and 17% faced published prices of $15,000 or more.[19]

Note that one cannot directly compare The College Board's pricing data for 2016-17 to the 2015-16 IPEDS data. This is due to a difference in reporting: IPEDS provides "institutional averages as reported by the institution, not average amounts paid by students (i.e., charges are not weighted by enrollment)."[20] The College Board data, on the other hand, provides enrollment-weighted data.[21]

Implications

- As the public awareness of college costs and student debt grows, so does pressure to contain costs. Libraries are cost-centers—they rarely bring in significant revenue—so libraries may be looked at as a place to cut.
- To preserve budgets, libraries will need to prove their value throughout the student lifecycle from recruitment to retention, from student learning to graduation rates.

Other Factors Affecting Price

In addition to tuition and fees, the total cost of higher education is affected by other factors such as room and board costs, textbook costs, and financial aid (not to mention other general expenses such as laundry, transportation, etc.). The College Board reports that room and board cost, on average, $8,060 for in-district students at public 2-year institutions and $10,440 for in-state students at public 4-year institutions. This equates to increases of 1.6% and 2.9% respectively, compared to The College Board's data for 2015-16.[22] The College Board report points out that many expenses such as housing and food "are expenses people face whether or not they are in school," and the real cost to many students is the forgone earnings of a full-time job. But "because students tend to think of living expenses as part of the cost of going to college, and because they must come up with the funds to cover these outlays, it is useful to use these expenses as a proxy for forgone earnings."[23]

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[19] The College Board, 13.
[20] Ginder, Kelly-Reid, and Mann (2016), 5.
[21] The College Board, 9.
[22] Ibid.
[23] The College Board, 8.

Textbook prices have also continued to increase, rising to $82 for the average new textbook and $59 for the average used textbook in 2014-15, compared to $79 and $59 in 2013-14 and $72 and $54 in 2012-13, according to the National Association of College Stores (NACS).[24] In the 2015-16 Student Watch report, which is based on student-reported spending habits, the average student's annual spending on textbooks and other course materials has decreased, perhaps due in part to the leveraging of textbook rental options.[25] More worrying, however, is the possibility that students are avoiding the costs and trying to complete courses without the required materials: in a 2014 report, 65% of students surveyed indicated that they had skipped buying a course textbook because of the cost, and as textbook prices continue to rise, this trend may persist or even increase, putting a student's academic success at risk.

Financial aid grants can decrease the actual price paid by students or their families (net price) as compared to the published tuition and fee price. In 2016-17, the average full-time, in-state student at a public 4-year college received enough grant aid and federal tax benefits to cover about 61% of the average published tuition and fee price.[26] However, when increases in published tuition and fees are compared to increases in grant aid between 2011-12 and 2016-17, the increase in grant aid only accounts for about 19% of the increase in published tuition and fees, suggesting that rising grant aid still may not be able to keep pace with rising prices.[27]

Implications

- Rising textbook costs present an opportunity for academic librarians to advocate for open-access (OA) textbooks and other open educational resources (OER) across campus, as one way to help decrease the overall cost of obtaining a college degree.
- Course reserves, a long-time library services, could see renewed interest as faculty, students, and campus administrators look to contain textbook costs.
- Campuses with a "library fee" should not expect students to vote in increases.

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[24] National Association of College Stores, "Higher Education Retail Market Facts & Figures," (2016), accessed January 4, 2016, at https://www.nacs.org/research/HigherEdRetailMarketFactsFigures.aspx.

[25] Ethan Senack, *Fixing the Broken Textbook Market: How Students Respond to High Textbook Costs and Demand Alternatives*, U.S. PIRG [Public Interest Research Group] and the Student PIRGs, (Washington, DC: Center for Public Interest Research, 2014), 4, accessed January 5, 2016, at http://www.uspirg.org/reports/usp/fixing-broken-textbook-market.

[26] The College Board, 20.

[27] The College Board, 8.

Enrollment Trends

Changes in Enrollment Figures

According to IPEDS, overall enrollment at Title IV institutions[28] has shown a slight decrease of about -1.6% from fall 2014 to fall 2015 (the latest enrollment data currently available from IPEDS),[29] and the State Higher Education Executive Officers Association (SHEEO) reports a "slight decline in each of the last four years" nationwide.[30] However, the picture is more varied after the IPEDS data is separated according to public/nonprofit or for-profit sectors. Enrollment at 4-year institutions in both the public and nonprofit sectors *increased* by a little over 1% during this period, while 4-year for-profit institutions saw an enrollment decrease of about -9%. Enrollment changes among 2-year institutions are more prounounced, although 2-year public institutions saw an approximate -3% decrease, 2-year private nonprofits saw instead an increase of almost 51%, and 2-year for-profit enrollment dropped by -17%.

Some analysts think that economic recovery from the recent recessions could contribute to enrollment declines—as more people are able to find jobs, fewer non-traditional students arrive at colleges in search of additional education and training.[31] Nevertheless, the persistent positive impact of a college degree on family income should continue to fuel enrollment demand: in 2015, "the median family income for families headed by a four-year college graduate was more than twice the median for families headed by a high school graduate."[32]

Implications

☐ Campuses funded heavily from tuition money will be the most affected by declining enrollments.

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[28] Title IV of the Higher Education Act of 1965 (HEA) covers the administration of the United States federal student financial aid programs. American colleges and universities are generally classified with regard to their inclusion under Title IV. See https://studentaid.ed.gov/sa/glossary - Federal_Student_Aid_Programs

[29] Ginder, Kelly-Reid, and Mann (2016), 8. Calculations performed by author to compare 2016 data to: Scott A. Ginder, Janice E. Kelly-Reid, and Farrah B. Mann, *Postsecondary Institutions and Cost of Attendance in 2014-15; Degrees and Other Awards Conferred, 2013-14; and 12-Month Enrollment, 2013-14: First Look (Provisional Data)* (NCES 2015-097rev), U.S. Department of Education, (Washington, DC: National Center for Education Statistics, 2016), accessed January 2, 2016, at https://nces.ed.gov/pubs2015/2015097rev.pdf.

[30] State Higher Education Executive Officers Association, *State Higher Education Finance: FY 2015*, (2016), 21, accessed January 2, 2016, at http://sheeo.org/sites/default/files/project-files/SHEEO_FY15_Report_051816.pdf.

[31] Ellen Wexler, "State Support Recovering, but Not Recovered," *Inside Higher Ed*, April 27, 2016, https://www.insidehighered.com/news/2016/04/27/public-colleges-relied-less-tuition-2015.

[32] The College Board, 29.

☐ Declining enrollments could affect per-FTE database licenses, so libraries experiencing dramatic enrollment changes should pay attention to potential cost-savings.

☐ The impact of fluctuating cost and enrollment will depend in large part on how a given library is funded. For example, overall increases in tuition and required fees may not include an increase in the library use fee; thus, funding by per-credit-hour student fees, coupled with declining enrollment, may result in a decreased library budget.

Regional Variations in High School Graduation rates

The Bureau of Labor Statistics reports that in "October 2015, 69.2 percent of 2015 high school graduates were enrolled in colleges or universities," or "about 2.1 million" students.[33] That percentage has remained steady for many years, although the total number of high school graduates has recently begun to decline.[34] The Western Interstate Commission for Higher Education (WICHE) predicts that "in many states education agencies and postsecondary institutions, used to planning for ever-larger demand, will face a new reality" as the supply of high school graduates declines or grows slowly in coming years.[35] The declining number of high school graduates is not uniform across the United States however. By 2027, WICHE predicts that total numbers will have declined in the Northeast by 11%, the Midwest by 12.4%, and the West by 6% from peak numbers in previous years, while the South is predicted to increase by 5.5% over a previous peak in 2011.[36]

The geographic distribution of high school graduates is of particular importance. According to a report from the American Council on Education, "the majority (57.4%)of incoming freshmen attending public four-year colleges enroll within 50 miles from their permanent home."[37] Whether because of "distance elasticity," "spillover effects," or "community ties," geography plays a large role in where undergraduate students attend college, which is why regional variations in the number of high school graduates affects institutions of higher education. A recent *Chronicle of Higher Education* report anticipates that "this supply-demand problem will be particularly acute in the Northeast

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[33] "College Enrollment and Work Activity of High School Graduates" (Washington, DC: Bureau of Labor Statistics, 2016), http://www.bls.gov/news.release/hsgec.toc.htm.

[34] "Digest of Education Statistics, 2015" (Washington, DC: National Center for Education Statistics, 2015), https://nces.ed.gov/programs/digest/d15/tables/dt15_302.10.asp.

[35] "Knocking at the College Door: Projections of High School Graduates 8th Edition" (Boulder, CO: Western Interstate Commission for Higher Education, December 2012), 5, http://www.wiche.edu/pub/knocking-8th.

[36] Ibid., 10.

[37] Nicholas Hillman and Taylor Weichman, "Education Deserts: The Continued Significance of 'Place' in the Twenty-First Century" (Washington, DC: American Council on Education, 2016), 2, https://www.acenet.edu/news-room/Documents/Education-Deserts-The-Continued-Significance-of-Place-in-the-Twenty-First-Century.pdf.

and Midwest, which are home to a greater concentration of institutions and are projected to produce fewer high school graduates over the next decade."[38]

Implications

- ☐ Public four-year colleges outside the South and West will likely face significant declines in enrollment.
- ☐ Potential downsizing could affect academic libraries in those institutions, including the increasing necessity to justify budgets and staffing in the libraries of affected institutions.
- ☐ Declines in undergraduate enrollment in the East and Midwest could change the proportion of undergraduate to graduate and traditional to non-traditional students and affect library services and collections.

Information Literacy Issues

Transition to Framework for Information Literacy for Higher Education

With the ACRL's rescinding of the *Information Literacy Competency Standards for Higher Education*[39] in 2016, academic librarians are now considering how to incorporate ACRL's new *Framework for Information Literacy for Higher Education*[40] into their practice. Use of the Framework requires strategies for making the transition from the performance-based goals of the previous *Standards* to a less prescriptive set of learning goals that emphasize conceptual understanding in the form of threshold concepts.[41] The fundamentally different approach of the *Framework* compared to the previous *Standards* has been the topic of vigorous debate throughout the profession.[42] A number of writers have examined the Framework and the process of standards revisions from a perspective grounded in critical theory.[43] Discussions of specific related issues are beginning to

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[38] Jeffrey J Selingo, *2026, The Decade Ahead: The Seismic Shifts Transforming the Future of Higher Education* (Washingtion, DC: The Chronicle of Higher Education, 2016), 9.

[39] Association of College and Research Libraries, "Information Literacy Competency Standards for Higher Education," 2000, http://www.ala.org/acrl/sites/ala.org.acrl/files/content/standards/standards.pdf.

[40] Association of College and Research Libraries, "Framework for Information Literacy for Higher Education," 2015, http://www.ala.org/acrl/standards/ilframework.

[41] Nicole Pagowsky, "A Pedagogy of Inquiry," *Communications in Information Literacy* 9, no. 2 (2015): 136–44; Trudi E. Jacobson and Craig Gibson, "First Thoughts on Implementing the Framework for Information Literacy," *Communications in Information Literacy* 9, no. 2 (2015): 102–10.

[42] ME Dempsey et al., "Continuing the Conversation: Questions about the Framework," *Communications in Information Literacy* 9, no. 2 (2015): 164–75.

[43] Emily Drabinski, "Toward a Kairos of Library Instruction," *The Journal of Academic Librarianship* 40, no. 5 (September 2014): 480–85, doi:10.1016/j.acalib.2014.06.002; Yasmin Sokkar Harker et al., "Seeking Social Justice in the ACRL Framework," *Communications in Information Literacy* 9, no. 2 (2015): 111–25; Kevin P. Seeber, "THIS IS REALLY HAPPENING: Criticality and Discussions of Context in ACRL's Framework for Information Literacy. . 2015;9(2):157.," *Communications in Information Literacy* 9, no. 2 (n.d.): 157–63.

appear in the literature, such as how to assess learners' conceptual understandings[44] and application of the *Framework* to discipline-specific information literacy needs.[45] Knowing how to speak to administrators and teaching faculty about the Framework is particularly important, especially given the fact that Middle States Commission on Higher Education—a regional higher education accreditation agency that had previously included information literacy as one of its important learning outcomes for students – released a draft revision of their accreditation standards that did not include information literacy in its set of learning outcomes, nor mentioned the teaching functions of librarians.[46] Though the standards were revised to include information literacy as a learning outcome, neither *libraries* nor *librarians* appear in the final version.[47] In contrast, the federal K-12 *Every Student Succeeds Act*[48] of 2015 includes language describing requirements for provision of effective school library programs. While this law does not apply to libraries in higher education, it is worthwhile to consider what the divergence between the two documents portends.

Implications

- Lack of support from accrediting bodies could downgrade the status of librarians as teaching partners.
- Work still needs to be done to make the Framework more easily implemented. Librarians must be confident in their understanding to communicate the elements of the Framework to faculty when they advocate for time to teach information literacy.

Libraries and Fake News

A particularly contentious presidential election cycle brought information literacy to the fore in the concern over the existence of "fake news" and the extent of its influence over the election results. A third of young Americans ages 18-29 get news from social

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[44] Megan Oakleaf, "A Roadmap for Assessing Student Learning Using the New Framework for Information Literacy for Higher Education," *The Journal of Academic Librarianship* 40, no. 5 (September 2014): 510–14, doi:10   .1016/j.acalib.2014.08.001.

[45] Larissa Garcia and Jessica Labatte, "Threshold Concepts as Metaphors for the Creative Process: Adapting the Framework for Information Literacy to Studio Art Classes," *Art Documentation: Journal of the Art Libraries Society of North America* 34, no. 2 (September 2015): 235–48, doi:10.1086/683383; Maureen Knapp and Stewart Brower, "The ACRL Framework for Information Literacy in Higher Education: Implications for Health Sciences Librarianship," *Medical Reference Services Quarterly* 33, no. 4 (October 2, 2014): 460–68, doi:10.1080/02763869.2014.957098; Rebecca Z. Kuglitsch, "Teaching for Transfer: Reconciling the Framework with Disciplinary Information Literacy," *Portal: Libraries and the Academy* 15, no. 3 (2015): 457–70, doi:10.1353/pla.2015.0040.

[46] Stephen Bell, "Why'd Middle States Go and Do That?," *ACRL Insider*, February 11, 2014, http://www.acrl.ala.org/acrlinsider/archives/8299.

[47] Middle States Commission on Higher Education, *Standards for Accreditation and Requirements for Affiliation* (Philadelphia, PA: The Commission, 2015), http://www.msche.org/publications/RevisedStandardsFINAL.pdf.

[48] "Every Student Succeeds Act," Pub. L. No. S. 1177 (2015).

media.[49] A Stanford University study showed that students in college, middle, and high school possess a troubling lack of skills in analyzing the validity of arguments in social media conversations and in differentiating advertisements from news stories, for example.[50] In a related vein, following the election the news source Buzzfeed found that the top twenty "fake news" stories appearing in social media in the final three months of the campaign—including the most-shared falsehood that Pope Francis endorsed Donald Trump for the presidency—generated more user engagement than the top news stories appearing on websites of 19 major news organizations.[51] In the wake of the election, Facebook, a major channel for media content for many Americans, announced plans to curtail the propagation of fake news by implementing user reporting mechanisms and partnering with fact-checking organizations.[52] Librarians were part of the conversation about fake news and its influence on civic society with commentary by and about librarians' roles in media education appearing in several major media outlets.[53]

The widespread availability and consumption of "fake news" is partly due to lack of knowledge and expertise in evaluating information sources, but it cannot be separated from the human tendency toward cognitive biases such as confirmation bias—accepting information as true which already meets our pre-existing beliefs and values, and anchoring bias—fixation on initial information one hears about a topic.[54] Social media combined with an explosion of information sources targeted for every conceivable demographic allow individuals to easily separate into information siloes, resulting in "filter bubbles" and "echo chambers." We must help learners expose the filter bubbles and help them to question the societal conditions that create the filter bubbles in the first place.

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[49] Pew Research Center, "The Modern News Consumer," July 2016, http://www.journalism.org/2016/07/07/the-modern-news-consumer/.

[50] Stanford History Education Group, "Evaluating Information: The Cornerstone of Civic Online Reasoning," November 22, 2016, https://sheg.stanford.edu/upload/V3LessonPlans/Executive%.

[51] Craig Silverman, "This Analysis Shows How Fake Election News Stories Outperformed Real News on Facebook," *Buzzfeed News*, November 16, 2016, https://www.buzzfeed.com/craigsilverman/viral-fake-election-news-outperformed-real-news-on-facebook.

[52] Mike Isaac, "Facebook Mounts Effort to Limit Tide of Fake News," *The New York Times*, December 15, 2016, https://www.nytimes.com/2016/12/15/technology/facebook-fake-news.html.

[53] Donald A. Barclay, "Column: Can Librarians Help Solve the Fake News Problem?," *PBS NewsHour*, January 6, 2017, http://www.pbs.org/newshour/updates/column-can-librarians-help-solve-the-fake-news-problem/; Kaitlyn Tiffany, "In the War on Fake News, School Librarians Have a Huge Role to Play," *The Verge [Time Magazine]*, November 16, 2016, http://www.theverge.com/2016/11/16/13637294/school-libraries-information-literacy-fake-news-election-2016; Shannon Najmabadi, "How Can Students Be Taught to Detect Fake News and Dubious Claims?," *Chronicle of Higher Education*, December 12, 2016, http://www.chronicle.com/article/How-Can-Students-Be-Taught-to/238652.

[54] Jennifer L Hochschild and Katherine Levine Einstein, *Do Facts Matter?: Information and Misinformation in American Politics*, 2015; Samantha Lee and Shana Leibowitz, "20 Cognitive Biases That Screw up Your Decisions," *Business Insider*, August 26, 2015, http://www.businessinsider.com/cognitive-biases-that-affect-decisions-2015-8.

Implications

- Higher education's concerns over fake news may increase opportunities for collaboration involving the evaluation of information sources and critical thinking.
- Efforts to teach learners how to evaluate information source quality should incorporate discussion of the effect of cognitive biases, personal beliefs, and values on one's approach to information evaluation.

New Forms of Education: Competency-Based Education

Competency-based education (CBE) disrupts the traditional concept of higher education instruction and competence in a discipline, from being conceptualized as accumulation of credit hours—or time on task in an educational program—to being conceptualized as the direct assessment of the learner's mastery of defined skills and knowledge.[55] Rather than prioritizing the education that happens within the bounds of an educational institution, learners are rewarded for on-the-job and experiential learning that is then bolstered by specific learning interventions to address deficiencies in knowledge and skills as they progress towards a degree. For example, a learner may require only a limited amount of coaching in a specific skill in order to reach a defined competency, or may need to enroll in an entire course in an area in which she lacks previous learning or experience.

This illustrates an important divergence from traditional programs: in the CBE model, a learner's progress to a degree is individualized and self-paced, making possible expedited progress through programs at a cost savings to the learner. In 2015, six hundred colleges and universities reported that they had already implemented or were currently developing competency-based programs[56] and a 2016 report by Ellucian found that institutions implementing CBE targeted the adult learner and represented enhancement of existing programs rather than creation of new programs.[57] One barrier to the widespread implementation of CBE programs is the federal financial aid requirement which bases aid awards on credit hours.[58] HR 3136, "Advancing CBE Demonstration Project Act,"[59] which would allow a small number of institutions to offer experimental CBE programs

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[55] EDUCAUSE Learning Initiative, "7 Things You Should Know About… Competency-Based Education," 2015, https://library.educause.edu/~/media/files/library/2014/2/eli7105-pdf.pdf.

[56] C Giesinger et al., "Scaling Solutions to Higher Education's Biggest Challenges: An NMC Horizon Project Strategic Brief," October 2016, http://cdn.nmc.org/media/2016-nmc-horizon-strategic-brief-scaling-solutions.pdf.

[57] R Garrett and H Lurie, "Deconstructing CBE: An Assessment of Institutional Activity, Goals, and Challenges in Higher Education," 2016, http://www.ellucian.com/Software/CBE-Maturity.

[58] Giesinger et al., "Scaling Solutions to Higher Education's Biggest Challenges: An NMC Horizon Project Strategic Brief."

[59] "Advancing Competency-Based Education Demonstration Project Act of 2014," Pub. L. No. HR 3136 (2014).

that would be eligible for federal financial aid, has been passed by the House of Representatives but has not yet been taken up by the Senate as of this writing.

While CBE proponents argue for the model's potential to decrease costs while increasing the accessibility of a college degree for adult learners, there are many critiques of the model. Some argue that it requires oversimplification of complex knowledge and skills in order to provide direct assessment of competency and that learners within the model experience a lack of social support and engagement due to the absence of a cohort.[60] Detractors also claim that that the model is being driven by a focus on job skills and vocational training spurred by economic expediency to the detriment of a liberal education, which could further compartmentalize lower- and middle-class Americans into lower levels of the economic order.[61]

For library services and collection development, CBE calls for an approach that is competency- and program-based rather than course-based. Librarians should know what competencies are important to each program and design collections of information resources targeting these competencies. Furthermore, since each learner proceeds through their educational program in an individualized sequence, our services will need to be promoted on an individual basis, highly embedded and integrated within the academic and easily accessible at the point of need.[62] For library instruction, it is crucial to understand the heightened importance of performance- and portfolio-based assessments that probe learners' ability to perform workplace-relevant tasks. The success of CBE hinges on educators' ability to define competencies and assess learners' mastery of them. Implementation of CBE will require librarians to work closely with disciplinary faculty in order to formulate information literacy-related competencies: what do successful professionals in various fields *do* and *produce* with information in the workplace? Then, librarians will need to collaborate with teaching faculty in order to design assessments that document the competency of learners to perform those tasks successfully. For example, work products and accompanying assessment rubrics will most likely look different from the traditional academic papers and citation analyses that librarians have often used in the past.[63]

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[60] Daniel Hickey, "A Framework for Interactivity in Competency-Based Courses.," *EDUCAUSE Review*, August 3, 2015, http://er.educause.edu/articles/2015/8/a-framework-for-interactivity-in-competency-based-courses.

[61] S Ward, "Competency-Based Education Threatens to Further Stratify Higher Education," *Inside Higher Ed*, February 1, 2016, https://www.insidehighered.com/views/2016/02/01/competency-based-education-threatens-further-stratify-higher-education-essay.

[62] Kristin M. Woodward, "Students at the Center in Emerging Academic Models: Embedded Information Literacy and Distance Services in the University of Wisconsin System Flex Degree," *Library Hi Tech News* 32, no. 7 (September 7, 2015): 12–15, doi:10.1108/LHTN-04-2015-0023.

[63] L Homol and R Miller, "Keeping Up With...Competency-Based Education," 2015, http://www.ala.org/acrl/publications/keeping_up_with/cbe.

Implications

- [ ] Academic librarians should continue to expand beyond one-shot instruction to more sustained instruction, whether that is through multiple modules, embeddedness, engaged design/tutorials, or through a focus on new forms of literacy, such as digital literacy.
- [ ] Librarians may need to rethink information literacy competencies to align with program-level competencies rather than course-based or introductory skills and devise ways for students to demonstrate their information competence in ways that align with the CBE methodology.
- [ ] Academic librarians need to continue to work closely with administrators, as well as departmental leadership, to demonstrate their added value to the curriculum and student learning. CBE might be one avenue for doing so.

SDigital Preservation

National digital stewardship agenda

In 2015, the National Digital Stewardship Alliance (NDSA) updated its National Agenda for Digital Stewardship,[64] identifying actionable recommendations to advance the community capacity for digital preservation. The agenda recognizes that "much of the investment and effort in the field of digital preservation has been focused on developing technical infrastructure, networks of partnerships, education and training, and establishing standards and practices. Little has been invested in understanding how the stewardship community will coordinate the acquisition and management of born-digital materials in a systematic and public way."[65] It thus calls for a robust empirical evidence base being built for generalizable guidance, basic research being paired with infrastructure development, and organizations and policies being focused on supporting long-term digital stewardship. The agenda highlighted LOCKSS (https://www.lockss.org/), DuraCloud (http://duracloud.org/), and the Digital Preservation Network (DPN) (http://dpn.org/) as the community-based platforms that continue to develop substantial functionality in support of long-term stewardship for digital scholarship. Recently EU funded projects are mentioned as progress in basic research: SCAPE (http://scape-project.eu/) designed an architecture for proactive and continuous preservation planning and monitoring which is context aware and can be integrated with operational systems;[66] 4C (http://www.4cproject.eu/) conducted an analysis of state of the art in digital curation cost modeling, developed an online Curation Costs Exchange tool and a roadmap of recommendations for affordable digital curation solutions and services.

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[64] NDSA Coordinating Committee and NDSA Working Group co-chairs, "2015 National Agenda for Digital Stewardship," 2014, http://hdl.loc.gov/loc.gdc/lcpub.2013655119.1.

[65] "2015 National Agenda for Digital Stewardship" (Washingtion, DC: National Digital Stewardship Alliance, September 2014), 4.

[66] Christop Becker, Luis Faria, and Kresimir Duretec, "Scalable Decision Support for the Digital Preservation," *OCLC Systems & Services: International Digital Library Perspectives* 30, no. 4 (2014): 249–84, doi:http://dx.doi.org/10.1108/OCLC-06-2014-0025.

University libraries leaders have witnessed the history of previous unsuccessful national print and digital preservation initiatives and they are now experiencing the recent limited attempts of some regional and some overlapped but still separated efforts on academic content preservations, for example, CLOCKSS (https://www.clockss.org/), Portico (http://www.portico.org/), the HarthiTrust (http://www.hathitrust.org/), the APTrust (http://aptrust.org/), and the DPN projects. They now call for a nation wide coordinated agenda to preserve the intellectual and cultural records and a system that is both robust and affordable. This must be a community effort and go beyond the walls of academic libraries, but it could also be an opportunity for the libraries to be the leader in this historical "time of change and uncertainty."[67]

University libraries' digital preservation practices

University libraries are no doubt the loyal members in the digital stewardship community, from earlier projects of digitizing and providing digital access to these digital collections to recently building institutional repositories for digital scholarship produced all through the research life cycle. As their digital collections continue to expand, university libraries started to re-evaluate their current preservation policies and practices and update digital asset management system (DAMS) to prepare for future preservation challenges. Earlier in 2011, The College of Charleston transferred to use open source DAMS when its original system hit a license limit and encountered multiple issues.[68] Start from 2014, Yale University began to invest in a unified Hydra/Fedora infrastructure.[69] More recently, the university of Houston Digital Library conducted a comprehensive assessment of existing DAMS and carefully planned the new system implementation based on its local context and needs[70]; the University of North Texas Libraries' self-audit used the Trusted Repositories Audit and Certification (TRAC) checklist to identify current issues;[71] the Atlanta University Center Robert W. Woodruff Library applied the Open Archival Information System (OAIS) Reference Model when considering their new system choices.[72]

Within our professional organization, ACRL, the Digital Curation Interest Group (established in 2011), together with the Digital Humanities Interest Group (established in

[67] Deanna Marcum, "Due Diligence and Stewardship in a Time of Change and Uncertainty," *Ithaka Issue Brief*, no. April (2016): 1–10; Mary M Case, "Preservation and Scholarly Communication: The Grand Challenges of Our Time," *Technicalities* 36, no. 5 (2016): 1, 3–6.

[68] Heather Gilbert and Tyler Mobley, "Breaking Up With CONTENTdm: Why and How One Institution Took the Leap to Open Source," *Code4Lib Journal*, no. 20 (2013): 1–9.

[69] Yale University Library IT, "Hydra/Fedora Presentation," 2014, http://web.library.yale.edu/sites/default/files/files/HydraFedoraMSSA_presentation-v2.pdf.

[70] A Wu, S Thompson, and R Vacek, "Hitting the Road Towards a Greater Digital Destination: Evaluating and Testing DAMS at University of Houston Libraries," *Information Technology and Libraries*, no. June (2016): 5–19, doi:10.6017/ital.v35i2.9152.

[71] Ana Krahmer and Mark Edward Phillips, "Communicating Organizational Commitment to Long-Term Sustainability through a Trusted Digital Repository Self-Audit," in *IFLA World Library and Information Congress, August 13-19, 2016.*, 2016.

[72] Christine Wiseman and Al Matthews, "Time, Money, and Effort: A Practical Approach to Digital Content Management," *AUC Robert W. Woodruff Library Staff Publications*, no. Paper 8 (2016): 38–63.

2014) and the Numeric and Geospatial Data Services in Academic Libraries Interest Group (established in 2010), proposed to form a Digital Scholarship Section at the end of 2016, visioning to combine and coordinate various professional expertise and efforts all related to organization, preservation, presentation, and communication of digital scholarly assets. This could be a new starting point for the academic librarianship to formally address the digital preservation challenge for digital scholarship, and we could expect more active and collaborative involvement and contribution in this field from our profession.

Implications

- ☐ University libraries' digital preservation efforts must continue with building an infrastructure that could effectively and efficiently support the changing scholarly communication life cycle as networked systems in light of the diversity of digital objects and media[73] and the increasing openness and collaborative nature of the research process.[74]
- ☐ Besides developing automation tools to gather good enough bibliographic metadata, taxonomy for complex scholarly objects, and a sustainable system accommodating new workflows, university libraries will have to not only collaborate internally, but also engage more with the content producers, publishers, research administrators, funder and many other stakeholders to secure funding, policy, and support for a robust and constantly evolving research and education system.[75]

Open Science and Open Data

Open Science

Discussion about the individual benefits of openness in research, in particular open data, has spread to a broad range of disciplines. Indeed, a growth of inter-disciplinary conversations about open research and data sharing are reflected in a spate of publications over the past several years across the life sciences,[76,77] physical sciences,[78]

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[73] Amy Kirchhoff, Sheila Morrissey, and Kate Wittenberg, "Networked Information's Risky Future: The Promises and Challenges of Digital Preservation," *Educause Review*, no. May/June (2015): 50–51.

[74] Rebecca Kennison and Lisa Norberg, "A Network Approach to Scholarly Communication Infrastructure," *Educause Review*, no. May/June (2015): 58–59.

[75] Kirchhoff, Morrissey, and Wittenberg, "Networked Information's Risky Future: The Promises and Challenges of Digital Preservation"; Kennison and Norberg, "A Network Approach to Scholarly Communication Infrastructure."

[76] Spires-Jones, T.L., Poirazi, P. and Grubb, M.S., 2016. Opening Up: open access publishing, data sharing, and how they can influence your neuroscience career. *European Journal of Neuroscience*, *43*(11), pp.1413-1419.

[77] New England Journal of Medicine - Perspectives on Data Sharing: http://www.nejm.org/page/data-sharing

[78] Schmidt, B., Gemeinholzer, B. and Treloar, A. (2016). Open Data in Global Environmental Research: The Belmont Forum's Open Data Survey. *PloS one*, *11*(1), p.e0146695.

and social sciences.[79],[80],[81] These frequently practical articles on the current state of open research within disciplines are important because they reflect discussion of professional norms by researchers within the discipline, rather than a discussion driven by libraries or administrators.

Open Science Policies and mandates remain on the rise, whether institutionally based or by funder. In the United States, the National Institutes of Health lead the charge by implementing a public access policy in 2008.[82] The response to the 2013 White House Office of Science and Technology (OSTP) memo on public access has resulted in over fifteen additional U.S. government agencies announcing plans for article and data sharing requirements.[83]

Outside of the United States, the Research Councils UK expanded the RCUK Policy on Open Access in 2013 for an anticipated five-year transition to open access.[84] Additionally, the Australian Research Council instituted an open access policy that same year, and the Netherlands Organization for Scientific Research implemented an open access policy in 2016.[85] And in 2015, the Higher Education Funding Council for England added an open-access mandate to the Research Excellence Framework.[86] The impact of these mandates are beginning to be seen, as illustrated in the *Ithaka S+R Jisc RLUK Survey of UK Academics,* where more respondents in 2015 acknowledge the importance of characteristics of open access than in the 2012 survey.[87]

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[79] Nosek, B.A., Alter, G., Banks, G.C., Borsboom, D., Bowman, S.D., Breckler, S.J., Buck, S., Chambers, C.D., Chin, G., Christensen, G. and Contestabile, M. (2015). Promoting an open research culture. *Science*, 348(6242), pp.1422-1425.

[80] Borgman, C.L., Darch, P.T., Sands, A.E., Pasquetto, I.V., Golshan, M.S., Wallis, J.C. and Traweek, S. (2015). Knowledge infrastructures in science: data, diversity, and digital libraries. *International Journal on Digital Libraries*, 16(3-4), pp.207-227.

[81] Herndon, J. & O'Reilly, R. (2016). Data sharing policies in social sciences academic journals: Evolving expectations of data sharing as a form of scholarly communication. In *Databrarianship: the academic data librarian in theory and practice* (Ed. Kellam, L.M. & Thompson, K.). Available at http://hdl.handle.net/10161/12792.

[82] "NOT-OD-08-033: Revised Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research," accessed November 18, 2016, http://grants.nih.gov/grants/guide/notice-files/NOT-OD-08-033.html.

[83] John Holdren, "Increasing Access to the Results of Federally Funded Scientific Research," Letter, (February 22, 2013), https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf; Amanda Whitmire et al., "A Table Summarizing the Federal Public Access Policies Resulting from the US Office of Science and Technology Policy Memorandum of February 2013," April 18, 2016, doi:10.6084/m9.figshare.1372041.v5.

[84] Research Councils UK, "RCUK Policy on Open Access and Supporting Guidance," April 8, 2013.

[85] Australian Research Council, "ARC Open Access Policy," Text, *ARC Open Access Policy*, (June 17, 2014), http://www.arc.gov.au/arc-open-access-policy; NWO, "Open Science," 2016, http://www.nwo.nl/en/policies/open+science.

[86] Higher Education Funding Council for England, "Policy - Open Access Research," *Higher Education Funding Council for England*, accessed November 18, 2016, http://www.hefce.ac.uk/rsrch/oa/Policy/.

[87] Christine Wolff, Alisa Rod, and Roger Schonfeld, "UK Survey of Academics 2015" (Ithaka S+R | Jisc | RLUK, June 15, 2016), http://www.sr.ithaka.org/publications/uk-survey-of-academics-2015/.

Funder mandates are not limited to just government agencies and public access to tax funded research. Open access policies have been instituted by the Wellcome Trust, Bill & Melinda Gates Foundation, and UNESCO.[88]

Open science and open access policies aren't restricted to only funders, as more and more universities and other research institutions have introduced their own open access policies. The Harvard Faculty of Arts and Sciences and the Harvard Law School adopted policies in 2008, followed by Massachusetts Institute of Technology and University of Kansas in 2009. Since then, these institutional policies have expanded to over 40 universities and research institutions in the United States, and over 300 around the world that require open access to research.[89]

Implications

- ☐ Librarians can support open research by providing expertise, coordination, and space for developing communities of practice at their own institutions.
- ☐ Librarians can support the local and disciplinary discussions of open research by supporting and facilitating conversations with stakeholders at their local institutions.
- ☐ Librarians who manage digital repositories should maintain awareness of emerging tools and platforms in open science to enable discovery and interoperability of data and associated metadata that are distributed across multiple systems.

Open Science tools

As Open Science becomes more widespread, more and more tools become available to support such endeavors. These tools may range from databases like Sherpa/Juliet and ROARMAP, where one can find funder mandate information, to Jmol, an open source viewer for 3D molecules. Preprint servers like arXiv and Biorxiv can be used to disseminate research papers before submission, establishing precedence for research and garnering feedback in addition to formal peer-review.[90] Figshare can be used to publish research outputs in a variety of formats, from datasets to conference slides to videos. And Open Science Framework, a research management platform that serves to provide version control, facilitate collaboration, and network project outputs, pulls it all together. This is only a short review of the tools available to support the open science and the scholarly conversation.

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[88] "Open Access Policy | Wellcome," accessed November 19, 2016, https://wellcome.ac.uk/funding/managing-grant/open-access-policy; "Open Access Policy," *Bill & Melinda Gates Foundation*, accessed November 19, 2016, http://www.gatesfoundation.org/How-We-Work/General-Information/Open-Access-Policy; UNESCO, "Open Access Policy Concerning UNESCO Publications," 2013, http://unesdoc.unesco.org/images/0022/002208/220872E.pdf.

[89] "ROARMAP," *Welcome to ROARMAP - ROARMAP*, accessed November 18, 2016, http://roarmap.eprints.org/.

[90] Krzysztof J. Gorgolewski and Russell A. Poldrack, "A Practical Guide for Improving Transparency and Reproducibility in Neuroimaging Research," *PLOS Biology* 14, no. 7 (July 7, 2016): e1002506, doi:10.1371/journal.pbio.1002506.

Implications

- [ ] In order to support open science, academic librarians need to develop workflows, consultation services and educational initiatives around open access, open data, and open science tools.
- [ ] In order to support open science and promote the reproducibility of research, academic libraries need to develop workflows and services to support open access to and transparency of research products.
- [ ] As more funders and institutions continue to require open access to science and research, academic librarians should develop workflows and services to support these mandates.
- [ ] As open science tools become more available, academic librarians should take the lead and promoting and supporting such tools.

Open Data

Open data is not free data. Openness demands infrastructure, expertise, and people to lead culture change. Rather than our infrastructure dictating our approaches, it should align with our values and support researchers in adopting systems and approaches that are most effective for open research.[91] Such resources carry costs for both the producers and consumers of data. However, the distribution of these costs across institutions, research centers, consortia, funders, publishers, and other stakeholders moving forward remains unclear. It has also become clear that open data is only one aspect of the emerging modern research environment.[92]

Funder data policies and publisher data availability requirements continue to drive the conversation about open data in many disciplines. In conjunction with a lack of institutional research data policy and guidance, these top-down drivers pose significant practical challenges for researchers in meeting the disparate and sometimes conflicting guidelines.[93] It is unclear yet how the federal funding agency policies, rife with ambiguity, will affect practice. In an effort to alleviate this uncertainty and to offer concrete guidance, many practical articles, reports, and guides have been written to help

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[91] Wilbanks, J. (2016). Keynote at the NIH Open Science Symposium. Available at http://www.slideshare.net/wilbanks/vannevar-bush-in-the-21st-century

[92] Treadway, Jon; Hahnel, Mark; Leonelli, Sabina; Penny, Dan; Groenewegen, David; Miyairi, Nobuko; Hayashi, Kazuhiro; O'Donnell, Daniel; Science, Digital; Hook, Daniel (2016): The State of Open Data Report. figshare. doi:10.6084/m9.figshare.4036398.v1

[93] Briney, K., Goben, A. and Zilinski, L., 2015. Do you have an institutional data policy? A review of the current landscape of library data services and institutional data policies. *Journal of Librarianship and Scholarly Communication*, *3*(2).

researchers adopt open research practices.[94,95,96] Common recommendations include being informed about funder and publisher policies, creating an operational data management plan, posting or registering study design, and thoroughly documenting the research process and resulting data. While our understanding of the benefits and costs associated with open data is still incomplete and the process of sharing data is nascent, effective practices and standards such as the FAIR Data Principles are beginning to emerge.[97] An emerging theme over the past couple of years is that the value of data lies in their use. The stories of individual projects and scholars continue to be powerful in advocating for greater openness. To that end, several organizations including DataONE, SPARC, and others are gathering them for use in training and advocacy.[98,99,100,101] Research efforts by Sage Bionetworks is developing open research practices while expanding the role of participants based on the belief that open research practices and tools are needed to solve our most difficult health problems.[102,103] As many researchers have discovered, the utility of open data is limited by the quality of the associated documentation and description. Metadata are critical to the discovery, evaluation, and reuse of open data.[104]

Many grassroots initiatives have arisen to help researchers and librarians develop the skills necessary to participate in and benefit from the emerging research environment.[105,106,107] Similarly, both informal certificate programs[108] and formal programs[109] in data science have expanded greatly. As a greater percentage of the research workforce develops the skills to work with larger and more complex data and infrastructure, open research practices will become more feasible and prevalent.

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[94] Michener WK (2015) Ten Simple Rules for Creating a Good Data Management Plan. *PLOS Computational Biology* 11(10): e1004525. doi: 10.1371/journal.pcbi.1004525

[95] Strasser, C., 2015. Research Data Management. *National Information Standards Organization*.

[96] Goodman A, Pepe A, Blocker AW, Borgman CL, Cranmer K, Crosas M, et al. (2014) Ten Simple Rules for the Care and Feeding of Scientific Data. *PLOS Computational Biology* 10(4): e1003542. doi:10.1371/journal.pcbi.1003542

[97] FORCE11. (2016). *Guiding Principles for Findable, Accessible, Interoperable and Re-usable Data Publishing version b1.0*. [online] Available at https://www.force11.org/fairprinciples.

[98] "Data Stories | DataONE," accessed December 10, 2016, https://www.dataone.org/data-stories.

[99] "Impact Stories," *SPARC*, accessed December 10, 2016, http://sparcopen.org/impact-stories/.

[100] "DIKW: Data, Information, Knowledge, Wisdom: Data Stories," accessed December 10, 2016, http://inkouper.blogspot.com/search/label/data%20stories/.

[101] "YourDataStories – EU Research Project on Opendata, Dataviz and DDJ," accessed December 10, 2016, http://yourdatastories.eu/.

[102] John Wilbanks, "Citizens as Partners in the Use of Clinical Data - O'Reilly Radar," accessed December 10, 2016, http://radar.oreilly.com/2014/05/citizens-as-partners-in-the-use-of-clinical-data.html.

[103] Wilbanks, J. and Friend, S.H., 2016. First, design for data sharing. *Nature biotechnology*. Available at http://www.nature.com/nbt/journal/v34/n4/full/nbt.3516.html

[104] Allard, S., Lee, C., McGovern, N.Y. and Bishop, A. (2016). The Open Data Imperative: How the Cultural Heritage Community Can Address the Federal Mandate. CLIR Publication No. 171. *Council on Library and Information Resources*.

[105] Software Carpentry. https://software-carpentry.org/

[106] Mozilla Science Lab: https://wiki.mozilla.org/ScienceLab

[107] Data Carpentry. http://www.datacarpentry.org/

[108] Coursera Data Science Specializations: https://www.coursera.org/browse/data-science?languages=en

[109] Data science programs in higher education. http://datascience.community/colleges

One key characteristic of scientific research is reproducibility, the ability to repeat studies while retaining consistent results. However, there is little incentive to investigate reproducibility and strong incentive to introduce new ideas.[110] There is concern in the sciences, and at large, that a not insignificant amount of published research includes false findings.[111] In light of these concerns, open reproducible research has been gaining increasing traction in the sciences. In the Reproducibility Project: Psychology, perhaps one of the most significant reproducibility studies, 270 contributing authors, the Open Science Collaboration, worked together to complete 100 replications.[112] By making the results freely and publicly available through the Open Science Framework, these collaborators are demonstrating guidelines put forth to support reproducibility.[113] Files associated with the project, from datasets to papers, are available for others to find, use, and build upon. This increases the transparency of the project, making this reproducibility study itself reproducible. Tools like the Open Science Framework, repositories, and platforms for openly sharing and disseminating research are integral to reproducibility.

Implications

- Libraries need to make open data discoverable and usable. Librarians will need to stay current on open datasets as another type of gray literature in their subject areas.
- Increasing use of data across the academy could escalate demand for computers with processing and visualization power. Libraries should consider if this capacity is service that they can provide to their campuses.

Curating Research Data

Established in 2013, the Research Data Alliance (RDA) (https://www.rd-alliance.org/) has now grown to include 4,500 volunteer members representing 115 countries and through working groups and interest groups and collectively working toward building the social and technical bridges that enable global open data sharing. RDA has so far endorsed many recommendations and outputs (https://www.rd-alliance.org/outputs-and-recommendations/all-outputs-recommendations) to help tackle infrastructure and data sharing challenges related to data reproducibility, preservation, legal interoperability, citation, data type registry, metadata and so on. Among these includes the 23 Things:

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[110] Brian A. Nosek, Jeffrey R. Spies, and Matt Motyl, "Scientific Utopia II. Restructuring Incentives and Practices to Promote Truth Over Publishability," *Perspectives on Psychological Science* 7, no. 6 (November 1, 2012): 615–31, doi:10.1177/1745691612459058.

[111] John P. A. Ioannidis, "Why Most Published Research Findings Are False," *PLOS Medicine* 2, no. 8 (August 30, 2005): e124, doi:10.1371/journal.pmed.0020124.

[112] Open Science Collaboration, "Estimating the Reproducibility of Psychological Science," *Science* 349, no. 6251 (August 28, 2015): aac4716, doi:10.1126/science.aac4716.

[113] Gorgolewski and Poldrack, "A Practical Guide for Improving Transparency and Reproducibility in Neuroimaging Research"; Nosek, Spies, and Motyl, "Scientific Utopia II. Restructuring Incentives and Practices to Promote Truth Over Publishability."

libraries for Research Data in 11 languages (https://www.rd-alliance.org/group/libraries-research-data-ig/outcomes/23-things-libraries-research-data-supporting-output) , an overview of practical, free, online resources and tools for librarians to incorporate research data management into their practice. Organizations, for example, the ICSU World data System (WDS) and the Data Seal of Approval (DSA) also partnered within RDA and developed their unified requirements for Core Trustworthy Data Repository certification. (https://www.icsu-wds.org/news/news-archive/wds-dsa-unified-requirements-for-core-certification-of-trustworthy-data-repositories). NISO has recently submitted a case statement[114] to the RDA seeking broad international participation in its initiative on developing a consensus framework for managing privacy risks related to the collection, preservation, sharing, use and re-use of research data.

With all above diligent global and collaborative efforts and the availability of tools, technology, and best practices, research data curation is still a big challenge to the digital preservation professionals. According to Research Data Canada (RDC)'s recent survey of 32 Canadian and international online data platforms, there are "a heterogeneity of features and services across platforms, non-standardized use of terms, uneven compliance with relevant standards, and a paucity of certified data repositories."[115] However, the launch of the Portage Network (https://portagenetwork.ca/) in 2014 by the Canadian Association of Research Libraries seem to be a very promising innovation that led by the library community with the ambition to develop a national research data culture, foster a community of practice for research data, and build Canada's national research data services and infrastructure. Besides a library based network of expertise on research data management, it's also going to be a national platforms for planning, preserving and discovering research data. The latter will allow multiple data centers and archives to ingest data, that could be preserved at a core network of dedicated trustworthy digital repositories, and accessible through various dissemination venues for use and reuse by researchers.[116] Curating and preserving government data in particular is potentially of even greater importance in light of the current administration, as some scientists believe.[117]

Implications

☐ Curating research data sets challenge academic librarians' existing knowledge and skill limits as well as the libraries' infrastructure and limited resources. Libraries should consider the multiple ways to incorporate these new services including

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[114] "Case Statement: Joint NISO-RDA Working Group on Privacy Implications of Research Data Sets," 2016, https://rd-alliance.org/sites/default/files/case_statement/15-1223 RDA Case Statement WG on Data %26 Privacy.doc - overlay-context=group/rdaniso-privacy-implications-research-data-sets-wg/case-statement/rdaniso-privacy-implications.
[115] Claire Austin et al., "Research Data Repositories: Review of Current Features, Gap Analysis, and Recommendations for Minimum Requirements," *IASSIST Quarterly*, no. Preprint (2015): 1–17.
[116] Chuck Humphrey, "Shared Stewardship of Research Data," 2016.
[117] Amina Khan, "Fearing Climate Change Databases May Be Threatened in Trump Era, UCLA Scientists Work to Protect Them," *Los Angeles Times*, January 21, 2017, http://www.latimes.com/science/sciencenow/la-sci-sn-climate-change-data-20170121-story.html.

expanding existing institutional repositories,[118] forming regional consortium[119] and even international organizations,[120] or collaborating directly with the research communities[121] and other stakeholders.[122]

☐ Academic libraries' continuous involvement with and contribution to this national and international agenda of preserving all relevant scholarly products as evidenced in research data curation will provide opportunities to engage with the research community, the government, and the public, through meaningful conversation and high level collaboration.

Scholarly Communication

Institutional Versus Subject Repositories

Low rates of deposit to Institutional Repositories (IRs) persist in the United States; while IR early adopter and leader MIT in 2016 celebrated their IR reaching 44% of the faculty articles published since implementation of their OA policy[123] and a few other universities such as Oregon State University and Nebraska State University have also surpassed 40%, U.S. universities as a rule remain below a 50% deposit rate. The University of California system has been holding at just 25%,[124] and the average voluntary deposit rate at U.S. universities without a deposit policy is much lower. While open archival mandates have been successful in Europe—resulting for instance in archival rates of 90% at the University of Liege in Belgium,[125] where the passive compliance mechanism in the mandate states that publications can only be considered for tenure and promotion if the final accepted manuscript has been deposited in the IR—the weaker institutional policies in the U.S. have not by themselves been sufficient to motivate high rates of deposit. However, a recent study by Oregon State, which saw deposit rates climb from 11% to

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[118] Laura Palumbo et al., "Preparing to Accept Research Data: Creating Guidelines for Librarians," *Journal of eScience Librarianship* 4, no. 2 (November 2015): e1080–e1080, doi:10.7191/jeslib.2015.1080.

[119] "Texas Digital Library Dataverse Implementation Working Group Final Report," 2016, https://tdl.org/wp-content/uploads/downloads/2016/09/TDL-DIWG-Final-Report.pdf.

[120] Andrea Goethals et al., "Facing the Challenge of Web Archives Preservation Collaboratively: The Role and Work of the IIPC Preservation Working Group," *D-Lib Magazine* 21, no. 5/6 (May 2015), doi:10.1045/may2015-goethals.

[121] Amy Barton, Paul J Bracke, and Ann Marie Clark, "Digitization, Data Curation , and Human Rights Documents: Case Study of a Library-Reseacher-Practitioner Collaboration," *IASSIST Quarterly*, no. Spring (2016): 27–34.

[122] Kevin R. Dyke et al., "Placing Data in the Land of 10,000 Lakes: Navigating the History and Future of Geospatial Data Production, Stewardship, and Archiving in Minnesota," *Journal of Map & Geography Libraries* 12, no. 1 (2016): 52–72, doi:10.1080/15420353.2015.1073655.

[123] Katharine Dunn, "New milestone for MIT faculty open access policy," *MIT Libraries: News & Events*, August 19, 2016, https://libraries.mit.edu/news/milestone-faculty-access-3/22639/.

[124] Paul Basken, "The U. of California's open-access promise hits a snag: The faculty," *The Chronicle of Higher Education*, July 7, 2016, http://www.chronicle.com/article/The-U-of-California-s/237044.

[125] Ian Chant, "Increasing participation in your institutional repository," *Library Journal*, February 1, 2016, http://lj.libraryjournal.com/2016/02/oa/increasing-participation-in-your-institutional-repository/.

45%, demonstrated that "outreach activities and mediated deposit services" may have more impact on deposit rate than a policy alone.[126]

One of the suggested contributors to low IR participation is that researchers tend to be more aligned with and more loyal to a discipline than an institution—at least in part because the average researcher will change universities at least once during their career[127]—and thus more likely to deposit to a subject repository versus an institutional repository. Indeed, compared to lagging IR deposit rates, the landscape of subject repositories grew significantly in 2016, with launches or announcements of SocArXiv: Open Archive of the Social Sciences, engrXiv, ChemRxiv, and PsyArXiv[128] joining the likes of bioRxiv and the original arXiv, which celebrated its 25th anniversary in 2016.

However, concerns loom about the risk of monetization of subject repositories—or the data they represent, in particular[129]—and open access initiatives in general. In May 2016, not long before the launch of SocArXiv, Elsevier acquired SSRN, a previous venue for open archives for the social sciences.[130] Elsevier has also begun building partnerships with universities to increase ties between its ScienceDirect platform and university IRs;[131] reactions to this partnership differ, due at least in part to a fundamental difference in philosophy concerning the goals and purpose of the IR,[132] and this very disagreement

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[126] Hui Zhang, Michael Boock, and Andrea Wirth, "It takes more than a mandate: Factors that contribute to increased rates of article deposit to an institutional repository," *Journal of Librarianship & Scholarly Communication* 3, no. 1 (January 2015): 14.

[127] Aaron Tay, "Are institutional repositories a dead end?," *Musings About Librarianship* (blog), August 11, 2016, http://musingsaboutlibrarianship.blogspot.com/2016/08/are-institutional-repositories-failing.html#.WDnJ9dQrKt9.

[128] Philip N. Cohen, "Announcing the development of SocArXiv, an open social science archive," *SocOpen: The SocArXiv Blog*, July 9, 2016, https://socopen.org/2016/07/09/announcing-the-development-of-socarxiv-an-open-social-science-archive/; "Announcing engrXiv, the eprint server for engineering," *engrXiv Blog*, July 27, 2016, http://blog.engrxiv.org/2016/07/announcement; American Chemical Society, "American Chemical Society announces intention to establish 'ChemRxiv' preprint server to promote early research sharing," press release, August 10, 2016, https://www.acs.org/content/acs/en/pressroom/newsreleases/2016/august/acs-announces-intention-to-establish-chemrxiv-preprint-server-to-promote-early-research-sharing.html; Sean Rife, "Introducing PsyArXiv: A preprint service for psychological science," *PsyArXiv Blog*, September 19, 2016, http://blog.psyarxiv.com/psyarxiv/2016/09/19/introducing-psyarxiv/.

[129] ckelty, "It's the data, stupid: What Elsevier's purchase of SSRN also means," *Savage Minds* (blog), May 18, 2016, http://savageminds.org/2016/05/18/its-the-data-stupid-what-elseviers-purchase-of-ssrn-also-means/.

[130] Roger Schonfeld, "Elsevier acquires SSRN," *The Scholarly Kitchen* (blog), May 17, 2016, https://scholarlykitchen.sspnet.org/2016/05/17/elsevier-acquires-ssrn/.

[131] Carl Straumsheim, "Opening up the repository," *Inside Higher Ed*, May 25, 2016, https://www.insidehighered.com/news/2016/05/25/university-florida-elsevier-explore-interoperability-publishing-space; Sacha Boucherie, "Publisher/University collaboration expands access to research articles," Elsevier, May 19, 2016, https://www.elsevier.com/connect/publisher-university-collaboration-expands-access-to-research-articles; Judith C. Russell et al., "Academic library and publisher collaboration: Utilizing an institutional repository to maximize the visibility and impact of articles by university auth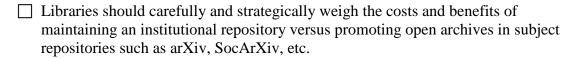ors," *Collaborative Librarianship* 8, no. 2 (2016), : http://digitalcommons.du.edu/collaborativelibrarianship/vol8/iss2/4.

[132] Ellen Finnie and Greg Eow, "Beware the Trojan horse: Elsevier's repository pilot and our vision for IRs & open access," *IO: In the Open* (blog), May 31, 2016, http://intheopen.net/2016/05/beware-the-trojan-

of what the IR does or should do seems to be at the heart of recent professional debates regarding the success or failure of IRs.[133]

These recent actions build upon Elsevier's past "research intelligence" acquisitions, such as Mendeley and Pure (formerly Atira), but the company is not alone in what Richard Poynder describes as "colonizing and building out the open access infrastructure;"[134] in 2016, scholarly publishing also witnessed the acquisition by John Wiley & Sons of the scholarly content hosting platform Atypon.[135] For-fee databases such as Inspec have begun integrating content from open repositories, and the FIZ AutoDoc document delivery service is now charging customers to be linked to freely available open-access content; Poynder asserts that it is "safe to assume" Elsevier will eventually begin charging for access to open content as well.[136] Some publishers such as Taylor and Francis and Springer Nature are also moving to provide libraries with automatic services for uploading both faculty pre-print and open access content into their respective IRs.

Implications

- ☐ Libraries should carefully and strategically weigh the costs and benefits of maintaining an institutional repository versus promoting open archives in subject repositories such as arXiv, SocArXiv, etc.

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horse-elseviers-repository-pilot-and-our-vision-for-irs-open-access/; Coalition of Open Access Policy Institutions, "COAPI Steering Committee statement on UF-Elsevier pilot," June 2, 2016, https://docs.google.com/document/d/1zSqYYRERO-0Bdqsh14Gje9WBOrD4srdhuO624a0dT24/edit; Barbara Fister, "When is the library open?," *Library Babel Fish* (blog), *Inside Higher Ed*, June 2, 2016; https://www.insidehighered.com/blogs/library-babel-fish/when-library-open; Roger Schonfeld, "Building a repository in partnership with Elsevier: The University of Florida's perspective," *The Scholarly Kitchen* (blog), June 29, 2016, https://scholarlykitchen.sspnet.org/2016/06/29/elsevier-uf-partnership/;Russell et al., "Academic library and publisher collaboration."

[133] Eric Van de Velde, "Let IR RIP," *SciTechSociety* (blog), July 24, 2016, http://scitechsociety.blogspot.co.uk/2016/07/let-ir-rip.html; Richard Poynder, "Q&A with CNI's Clifford Lynch: Time to re-think the institutional repository?," *Open and Shut?* (blog), September 22, 2016, http://poynder.blogspot.co.uk/2016/09/q-with-cnis-clifford-lynch-time-to-re_22.html; Kathleen Shearer, "More on the future of repositories: Response to Richard Poynder," *COAR: Confederation of Open Access Repositories*, September 28, 2016, https://www.coar-repositories.org/news-media/more-on-the-future-of-repositories-response-to-richard-poynder/; Richard Poynder, "Institutional repositories: Response to comments," *Open and Shut?* (blog), October 5, 2016, http://poynder.blogspot.com/2016/10/institutional-repositories-response-to.html; Aaron Tay, "Making scholarly communication great again: Do institutional repositories still have a role?" (presentation for UKSG, online, October 26, 2016), http://www.uksg.org/webinars/institutionalrepositoriesandopenaccess.

[134] Poynder, "Q&A," 6.

[135] Wiley-Blackwell, "Wiley signs definitive agreement to acquire Atypon," press release, August 18, 2016, http://www.wiley.com/WileyCDA/PressRelease/pressReleaseId-127702.html.

[136] Institution of Engineering and Technology, "IET announces the release of arXiv content in Inspec," press release, *National Federation of Advanced Information Services (NFAIS)*, September 13, 2016, http://www.nfais.org/index.php?option=com_content&view=article&id=475:iet-announces-the-release-of-arxiv-content-in-inspec&catid=23:industry-news&Itemid=113; FIZ AutoDoc, "New feature: Links to open-access sources," *FIZ AutoDoc*, June 14, 2016, http://www2.fiz-karlsruhe.de/fiz_autodoc_news.98.html?L=1&cHash=b42cc35b9b4264d899027a7c0fb34ccf&no_cache=1&tx_ttnews%5Btt_news%5D=2014; Poynder, "Q&A," 7.

☐ Libraries committed to growing their institutional repositories would be well-served to aggressively pursue open archival mandates, including, when possible, passive compliance mechanisms tied to tenure and promotion.
☐ Libraries should consider carefully commercial vendor strategies in the IR environment.

Open Peer Review

As libraries take a larger role in the publishing scholarly monographs and journals, one area to watch is that of open peer review in the scholarly communication process. Open peer review can be utilized in several different ways – through signed reviews, publishing signed reviews and author responses alongside an article, or even through crowd-sourcing peer review via comments to pre-print services such as ArXiv.org – ultimately open peer review is characterized by transparency.[137]

As a result, this transparency is attributed with relieving a number of potential issues related to the blind peer review process. Where it has been suggested blind peer review leads to reviewer abuse, open peer review provides accountability for reviewers to provide courteous, high quality, professional reviews.[138] At the same time, open peer review can provide added value for reviewers by publicly crediting them for their time and intellectual contributions to the final manuscript.[139] Additionally, it has been suggested that open peer review can contribute to the reproducibility of research and easier identification of misconduct.[140] Furthermore, it has been suggested that open peer review can strengthen scholarly communities through dialogue, achieve social justice by challenging elitism in the scholarly communication process, and help that process take place faster than through blind peer review.[141]

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[137] Elizabeth Walsh et al., "Open Peer Review: A Randomised Controlled Trial," *The British Journal of Psychiatry* 176, no. 1 (January 1, 2000): 47–51, doi:10.1192/bjp.176.1.47; Elizabeth C. Moylan et al., "Open, Single-Blind, Double-Blind: Which Peer Review Process Do You Prefer?," *BMC Pharmacology and Toxicology* 15 (2014): 55, doi:10.1186/2050-6511-15-55; Kathleen Fitzpatrick, "Peer-to-peer Review and the Future of Scholarly Authority," *Social Epistemology* 24, no. 3 (July 1, 2010): 161–79, doi:10.1080/02691728.2010.498929; David Shotton, "The Five Stars of Online Journal Articles - a Framework for Article Evaluation," *D-Lib Magazine* 18, no. 1/2 (January 2012), doi:10.1045/january2012-shotton.

[138] Walsh et al., "Open Peer Review"; Axel Boldt, "Extending ArXiv.org to Achieve Open Peer Review and Publishing," *Journal of Scholarly Publishing* 42, no. 2 (January 1, 2011): 238–42, doi:10.3138/jsp.42.2.238; Fitzpatrick, "Peer-to-peer Review and the Future of Scholarly Authority."

[139] Ulrich Pöschl, "Interactive Journal Concept for Improved Scientific Publishing and Quality Assurance," *Learned Publishing* 17, no. 2 (April 1, 2004): 105–13, doi:10.1087/095315104322958481.

[140] Boldt, "Extending ArXiv.org to Achieve Open Peer Review and Publishing"; Pöschl, "Interactive Journal Concept for Improved Scientific Publishing and Quality Assurance."

[141] Boldt, "Extending ArXiv.org to Achieve Open Peer Review and Publishing"; Pöschl, "Interactive Journal Concept for Improved Scientific Publishing and Quality Assurance"; Thomas H.P. Gould, "Scholar as E-Publisher," *Journal of Scholarly Publishing* 41, no. 4 (June 1, 2010): 428–48, doi:10.3138/jsp.41.4.428; Kathleen Fitzpatrick and Avi Santo, "Open Review: A Study of Contexts and Practices," December 1, 2012, https://mellon.org/resources/news/articles/open-review-study-contexts-and-practices/.

There are deterrents to utilizing open peer review, as it will impact scholarly communication, from authors and reviewers, to editor, publishers, and journals.[142] There may be hesitancy to move from a well-known system to signing reviews or knowing who article authors are.[143]

Implications

- [ ] Libraries acting as publishers need to investigate the support and integration of open peer review in their publication process.
- [ ] As interest grows, academic librarians should develop consultation services and educational initiatives to support authors interested in taking advantage of open peer review.

Open Access and Collection Management Trends

The JISC study from May 2016 offers some significant analysis of trends in Article Processing Fees, particularly paying attention to offsetting costs and publisher responses and to the need for the accurate recording of Article Processing Charge (APC) cost data.[144] The recent ARL SpecKit (SpecKit 353) also focuses on trends across ARL libraries in the funding, management, and policies of open access funds that support APCs. An increasing number of symposia, including the recent symposium at University of Kansas, are critically reassessing the development and trends of APCs in the scholarly communication ecosystem. Interesting findings from these studies and discussions include (1) the slowing down of APC support overall due to budget constraints within library budgets, (2) the need for greater transparency in terms of measuring APCs, including grant/voucher schemes and other offsetting costs, (3) the convergence of APCs across publishers, and (4) "double dipping" in the context of hybrid journals.

Building upon the OA2020 White Paper from the Max Planck society,[145] which proposed a flipped model (article processing fees in lieu of subscription costs) for the funding of academic journals, the 2016 Pay-it-Forward Study[146] from the University of California (Davis) concludes that such a funding model is indeed feasible, albeit in the most broadest of senses, and would not only depend on library collection budgets, but also on external partners such as grant funding agencies. One of the fundamental assumptions in these studies is that there is value in uncovering the costs of publishing, and thereby possibly allowing authors and researchers to place pressure on publishers. The report's

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[142] Emily Ford, "Defining and Characterizing Open Peer Review: A Review of the Literature," *Journal of Scholarly Publishing* 44, no. 4 (January 1, 2013): 311–26, doi:10.3138/jsp.44-4-001.

[143] Kathleen Fitzpatrick and Katherine Rowe, "Keywords for Open Peer Review," *Logos* 21, no. 3 (December 1, 2010): 133–41, doi:10.1163/095796511X560024.

[144] "Article Processing Charges and Subscriptions: Monitoring Open Access Costs." JiSC publication. https://www.jisc.ac.uk/reports/apcs-and-subscriptions. Accessed December 7, 2016.   Also of interest may be the Open Access Symposium on "Beyond APCs/BPCs" held at University of Kansas in November 2016 (https://www.jisc.ac.uk/reports/apcs-and-subscriptions).

[145] The White Paper led to the unveiling of a website which outlines a roadmap for large scale transformation of scholarly dissemination to be open access. See more here: http://oa2020.org/.

[146] For the Pay-it-Forward study's background and the final report, see http://icis.ucdavis.edu/?page_id=713. Accessed November 21, 2016

publication has led to renewed interest in the political economy of academic publishing ecosystems and new sustainable business models (recognizing the differences between the scholarly monograph and journal environments). The Pay it Forward rather rigorous and unique in that incorporates numerous assessments of pricing patterns, likely user behaviors, library expenditure trends, and extramural (external) research funding sources, as well as a very extensive bibliography on open access models, trends and cost analyses.

There have been a number of critiques (possibly better to frame as concerns) of the APC model proposed by the Pay-it-Forward study. The most prominent of these concerns come from Virginia Steel, the University Librarian at UCLA. Her concerns can be summarized in a few key points:

- ☐ APCs vary significantly, and there is no "true" cost for APCs, therefore making predictions based on the flipped model unreliable.
- ☐ There may be encouragement, or at least some incentive, on the part of journal publishers to consolidate and thereby increasing APC costs to universities and colleges
- ☐ The role of prestige and reward structures in the academy may complicate the equity and cost of the model
- ☐ Significant time and effort in the execution and implementation of the flipped model will be necessary.
- ☐ It is unlikely to change the "current balance of power" in the journal publishing in terms of controlling intellectual content.[147]

Another key concern would center upon the issue of digital preservation, which does not seem to be addressed much in these flipped models. In addition, the collection management paradigm under such a model would be radically altered. Local collections, for example, are certainly not solely based upon faculty publishing choices.

It is evident, in light of the creation of open access platforms by major publishers (and hybrid journals) that this gold open access is no longer viewed as an existential threat to revenue. However, with that said, there is the definite concern of whether publishers can still receive the funding they require for their editorial, curatorial and dissemination functions to break-even. However, there is growing concern, voiced by a number of heads of collection development, that publishers (particularly those with hybrid journals) may be "double-dipping" in terms of revenue streams. Although many publishers eschew double-dipping policy, several studies demonstrate that total subscription costs (TPCs) must now incorporate APCs in addition to tradition subscriptions to large commercial publishers.[148]

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[147] Virginia Steel "Open Letter to the Academic Community." October 19, 2016.
https://www.library.ucla.edu/sites/default/files/Ginny-Steel_open-letter_OA2020-PIF_October-2016.pdf
[148] Stephen Pinfield, Jennifer Salter and Peter A. Bath (2015) "The Total Cost of Publication in a Hybrid Open-Access Environment: Institutional Approaches to Funding Journal Article-Processing Charges in Combination with Journal Subscriptions." *Journal for the Association of Information Science and*

Some agreements have taken place out of APCs, e.g., the Association of Dutch Universities has made an agreement with Wiley allowing its scholars to publish in Wiley journals without any APCs.

Publishers have countered with the issue of whether current APCs are actually enough to truly cover publishing costs and associated activities of high-end journals and in particularly costs incurred by smaller or new publishers.[149] There are industry experts who estimate that per-article fees are way too low to protect even small margins. Some have argued that there should be more emphasis on author submission fees, which may actually de-incentivize some researchers, thereby leading to lower numbers of submissions overall. The argument goes that the lower number of submissions will substantially reduce the editorial board/office workload as well as help defray the costs of rejection or revise and resubmits (R+Rs).   However, a downside is no doubt that submission fees may actually place journals at a competitive disadvantage. Such a downside may help explain why the submission fee model (either in addition to, or in lieu of the APC) has not been widely adopted as of yet (although in some disciplines, such as Finance, there is a wider option). In addition, the argument might be made that the low APCs will actually lead to more consolidation of OA titles for reasons of economies of scale, and therefore reduce competition in the marketplace.

In the area of scholarly monographs, several new studies, including those from Ithaka S+R[150] and the American Association of University Publishers AAUP, have attempted to quantify the actual costs of producing an academic monograph. A wide variation in cost estimates have resulted from these studies, but are usually within the range of $25-$30K. These cost assessments are some of the first to rigorously ask what essential services publishers provide to the academic community.[151] For the Humanities and Social Sciences, recent Mellon studies have called for the possible university subvention of monographs (through joint funding from the Provost and academic libraries).[152] Such subventions may be more sustainable in larger more research-intensive institutions.[153] More research is being performed to determine how these subventions would be managed

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Technology 67: 1751-1766. Also see the *ARL Spec Kit 353: Funding Article Processing Fees* for payment methods and strategies in ARL libraries.

[149] See David Crotty "Can Highly Selective Journals Survive on APCs?" *The Scholarly Kitchen.* http://scholarlykitchen.sspnet.org/2016/10/10/can-highly-selective-high-end-journals-survive-on-apcs. Accessed November 30, 2016.

[150] Nancy Maron, Christine Mulhern, Daniel Rossman and Kimberly Schmelzinger (2016) "The Costs of Publishing Monographs: Towards a Transparent Methodology." Ithaka S+R Report. https://doi.org/10.18665/sr.276785

[151] Note there have been more informal attempts on the part of publishers to list their substantive functions and how these functions have increased and/or become more complex. For example, see Kent Anderson's "96 Things Publishers Publishers Do (2016 Edition)": https://scholarlykitchen.sspnet.org/2016/02/01/guest-post-kent-anderson-updated-96-things-publishers-do-2016-edition/. Accessed November 21, 2016.

[152] Michael Elliot et al. "The Future of the Monograph in the Digital Era: A Report to the Andrew W. Mellon Foundation by Emory University." July 1, 2015. https://pid.emory.edu/ark:/25593/q4fd0.

[153] Carolyn Walters et al. "A Study of Direct Author Subvention for Publishing Humanities Books at Two Universities: A Report to the Andrew W. Mellon Foiundation by Indiana University and the University of Michigan." September 15, 2015. https://hdl.handle.net/2027.42/113671.

and how open access monographs would be licensed and strategies for long-term preservation.

Open Access collection policies are becoming more common as a means to mange and guide libraries in participating in open access initiatives, as well as in selecting and vetting content to incorporate into their respective catalogs.[154] In providing financial support to collaborative open access schemes, libraries must weigh the benefits of advocacy with sustainability (i.e., support for more sustainable business models and economies/efficiencies of scale). These collaborative models are of course prone to free rider problems (all benefit without contribution).   Some initiatives are moving more towards an investment model rather than a project-by-project model—which has been the norm. Others such as Norberg and Kennison (2014) have made the case for "partnerships among scholarly societies and academic libraries funded by an institutional fee structure based on a student-and-faculty per-capita sliding scale."[155] This model is important to note, as it focuses more on the Humanities and Social Sciences, which have not been as involved in the emergence of APCs in the open access environment as have the STEM disciplines. Grant funding still seems to be particularly important as a means to provide seed money or feasibility funds, e.g., the Mellon/NEH Humanities Open Book Program. It is still rather early to consider significant acquisition budgets to be permanently designated for open access rather than for traditional vendor/publisher purchases, but this balance of funding and priorities might change as local collections matter less, and a more "facilitated" or "collective" collection becomes the norm.[156]

Implications

- ☐ Librarians must continue to balance the hybrid scholarly publishing world of subscription and open access publications
- ☐ The demand and cost of/for APCs is outpacing library budgets. Therefore, librarians may need to consider more budget flexibility, cost sharing, or consortial models, in accommodating APCs.
- ☐ University presses and libraries should continue to forge closer relationships and partnerships as monograph publishing strategies and funding change
- ☐ Libraries must consider the financial implications for APC support and be wary of potentially negative externalities of pure APC approaches
- ☐ Open access collection building as well as funding of open access initiatives should be monitored and policies developed to steer decision-making

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[154] For some notable examples, see Emory's Open Access Collection Development Policy (http://guides.main.library.emory.edu/ld.php?content_id=16498194) and the University of North Texas' Open Access and Born Digital Collection Policy (http://www.library.unt.edu/policies/collection-development/oa-collection-development-policy).

[155] Lisa Norberg and Rebecca Kennison (2014) "Toward a Scalable and Sustainable Approach to Open Access Publishing and Archiving for Humanities and Social Sciences: A Proposal." *Learned Publishing* 27: 223-235.

[156] Bob Kleft (2016) "Curating Collective Collections—Open Sesame: Collection Development at the Network Level." *Against the Grain* 28(4): 87-88.

Collection Assessment, Evaluation, and Analytics

As the recent ARL Spec Kit on Collection Assessment (#352) makes clear, collection assessment and evaluation has been significantly integrated into most academic libraries functions, and has taken on more of a "normality" than a project focus.[157] Such assessment is much in line as libraries consider closer integration with local, national and international communities, both in terms of services and in the collections they provide or facilitate access to. The survey uncovers the varied goals, rationales, and methodologies for collection assessment, including (but certainly not limited to):

☐ Cost-per-use for electronic resource purchase and cancellation decisions
☐ Overlaps with other libraries for weeding and print retention commitments (Sustainable Collection Services, Gold Rush, etc); these sorts of large scale comparisons are becoming more remarkable as the idea of the "collective" and/or "facilitated" collection gain more traction in the community
☐ Digitization initiatives
☐ Selector/subject liaison effectiveness
☐ Approval plan use
☐ Adapting collections to new discipline areas

In terms of technology and staffing, there are a number of trends that appear:

☐ Collection analyst/strategist/assessment positions are becoming the norm (either full time, or significant percentages of a staff person's time)
☐ Greater emphasis on visualization tool—which often require significant training to effectively utilize—such as Cognos and Tableau
☐ There is greater emphasis and pressure placed on ILS providers/vendors to better incorporate and integrate usage statistics and assessment tools within their respective products

Despite the greater emphasis and normalization of such assessment efforts, numerous challenges have been identified in collection assessment, including:

☐ Data integration (with local systems, for example—particularly in light of some institutions' ILS changes/migrations)
☐ Consistency/quality of data as well as comprehensiveness
☐ Comparability, validity and reliability of data
☐ Volume of data (and its management and preservation)
☐ Staffing and expertise

As noted in the *College and Research Libraries* Top Ten Trends from 2016, collection assessment practitioners have been expanding their data sources to incorporate new data sources, such as EZProxy logs and in-depth analysis of ebook logs/statistics to gain a

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[157] Karen R. Harker and Jeannette Klein (2016) *ARL Spec Kit 352: Collection Assessment.* ARL Publications.

better understanding of which patrons are using e-resources and once in those resources, how they are interacting with them. Yet, traditional circulation studies and bibliometric analyses of theses and dissertations are still quite prevalent in the literature.

Implications

- ☐ Libraries need to continue to work with vendors to develop and leverage more robust usage data tools for resources
- ☐ Libraries need to consider devoting more staff and technological resources, both locally and collectively, to gathering, analyzing, and implementing collection assessment tools
- ☐ Continued research should be conducted in understanding user behavior within and interactions with e-resources, particularly behavior associated with ebooks and ebook platforms.

Research Evaluation and Metrics

Research Evaluation

As internet based technologies have revolutionized the production and dissemination of scholarly knowledge, so too must the evidence and strategies used to evaluation scholarly activities adapt. Amidst political turmoil and stiff competition for funding, the conversation about evaluating research activities and outputs continues to develop rapidly. Though the U.S. does not have a national evaluation program like those in the UK[158] and Germany,[159,160] prevailing practices for evaluating the output of faculty for hiring, funding, and promotion and tenure generally rely heavily on journal articles and citations as proxies for research quality and impact. This practice of relying on a narrow subset of scholarly products and bibliometrics to evaluate the quality of a scholar's work has led to oversimplification of scholarly output and impact. In turn, this has led to adverse effects such as salami publishing, honorary authorship, citation cartels, and other unethical behavior.[161] While scholarly impact as a concept is dynamic and contextual,[162] the Journal Impact Factor remains entrenched in research evaluation practices at the institutional level because it makes the work manageable (according to Borchardt[163]).

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[158] U.K. Research Excellence Framework - http://www.ref.ac.uk/

[159] Germany's Excellence Initiative - http://www.dfg.de/en/research_funding/programmes/excellence_initiative/

[160] https://www.research-in-germany.org/en/research-landscape/research-ranking.html

[161] Haustein, Stefanie, and Vincent Larivière. "The use of bibliometrics for assessing research: possibilities, limitations and adverse effects." In *Incentives and performance*, pp. 121-139. Springer International Publishing, 2015.

[162] NISO. Outputs of the NISO Alternative Assessment Project (RP-25-2016), 2016. Available at http://www.niso.org/apps/group_public/document.php?document_id=17090

[163] Williams, C., & Padula, D. The Evolution of Impact Indicators: from bibliometrics to altmetrics. 2016.

Requirements to make the publications resulting from federally funded research accessible to the public in conjunction with a trend to view research data as valuable outputs of research and the resulting federal focus on data management practices has accelerated the pace of change in research evaluation. Many scholars are now expected to report outputs beyond publications of their research along with evidence of the resulting impact. The NISO Alternative Assessment Metrics (Altmetrics) Initiative released a draft table listing a wide range of scholarly outputs (see Google document at https://sites.google.com/a/niso.org/scholarlyoutputs/) as a first attempt at a comprehensive list of research outputs. Related to research impact is the expanding use of persistent identifiers for the actors, inputs, and outputs of research. The NISO report includes a link to an initial attempt to identify and characterize these efforts at https://sites.google.com/site/nisopersistentids/.

Our current policy environment presents an important opportunity to expand the view of research impact to include a more comprehensive picture of outputs, evidence, and types of impact. An example of a model that takes a broad view is the Becker Model for Assessing the Impact of Research, which offers a detailed list of research outputs along with five categories of impact – advancement of knowledge, clinical implementation, community benefit, economic benefit, policy and legislation (Bernard Becker Medical Library, Washington University School of Medicine https://becker.wustl.edu/impact-assessment).

Metrics

Metrics are often discussed and used as direct measures for research quality, productivity, impact, and influence. However, existing evidence only supports their use as *indicators* of impact or influence. Research quality is best evaluated by experts, usually through peer review.

Currently, we lack theoretical concepts on which to base our interpretations of citation metrics, webometrics, and altmetrics. Citation metrics are assumed to measure influence or scholarly impact, while altmetrics include an array of heterogeneous data that describe recorded online events without adequate understanding of the underlying acts being measured.[164] Despite this gap in theory, citation metrics have been used for decades in order to evaluate research. Perhaps the greatest limitation of citation metrics is that they do not provide insights into the community, economic, or policy and legislative impacts of scholarship.[165] More specifically, the most commonly used citation metric—Journal Impact Factor—is neither a predictor nor a good representative of actual citations.[166] In order to address some of the concerns expressed about the JIF, several normalized citation metrics have been developed over the past decade. The most recent of which is the Relative Citation Ratio (RCR) developed by the National Institutes of Health for

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[164] Haustein, Stefanie. "Grand challenges in altmetrics: heterogeneity, data quality and dependencies." *Scientometrics* (2016): 1-11.
[165] Haustein & Larivière, 2015
[166] Haustein & Larivière, 2015

NIH-funded publications.[167] However, normalized citation indicators also have limitations, most notably that the relative impact of an article varies with different definitions of research fields.[168] Scientometrics researchers believe that multiple metrics should be used to evaluate research, mirroring the complexity of scholarly communication. In fact, Haustein & Larivière[169] emphasize that peer review and bibliometrics are best used in combination.

Altmetrics is a term encompassing a broad range of digital indicators for scholarly output. These indicators are derived from online activity and engagement among a diverse group of stakeholders, both academic and public.[170] A growing number of scholars are experimenting with altmetrics to tell a more complete story about their scholarship and its impact.[171] This pattern is similar to the adoption of citation metrics. Though we do not yet have a theoretical framework for understanding the types of acts and intentions for which altmetrics are indicators, practice is outpacing theory. Williams and Padula[172] suggest that altmetrics enable researchers to tell a richer, more detailed story of their scholarship by supporting three activities: 1) monitoring and tracking attention to the output; 2) showcasing engagement; and, 3) enabling greater discovery. Altmetrics also allow stakeholders to view the context of engagement and discussion, not just a tally of interactions. They also describe benefits to publishers, which include enabling them to showcase activity around their product, to demonstrate their value, and to gauge the effectiveness of promotional activities.

With this view of metrics as indicators rather than direct measures of impact or influence, the discussion of the relative strengths and weakness is advancing, offering greater nuance to guide practical understanding and use. However, it is important to remember that data integrity (e.g., data that are both valid and reliable) is an issue inherent in all information systems.[173] Challenges particular to altmetrics include heterogeneity, data quality, and dependencies.[174] The greatest challenge at this point is the lack of knowledge about the acts producing altmetrics and the extent to which they represent engagement with scholarship.

The NISO report also offers recommendations for metrics relating research data: 1) data citations should be implemented following the Force11 Joint Declaration of Data Citation Principles; and, 2) standards for research-data-use statistics need to be developed. More generally, metrics for research data should be consistent with bibliometric approaches for other research outputs.[175]

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[167] https://icite.od.nih.gov/

[168] Haustein & Larivière, 2015

[169] 2015

[170] NISO, 2016

[171] Williams & Padula, 2016

[172] 2016

[173] Gordon, Gregg, Jennifer Lin, Richard Cave, and Ralph Dandrea. "The question of data integrity in article-level metrics." *PLoS Biol* 13, no. 8 (2015): e1002161.

[174] Haustein, 2016

[175] NISO, 2016

While our understanding of the rapidly shifting scholarly communication ecosystem is incomplete, scientometrics scholars generally agree on two key points: no single metric is an appropriate measure for research quality or impact; and citation metrics, webometrics, and altmetrics are imperfect indicators of research impact.[176]

Implications

- ☐ Librarians should expect and hold altmetric data providers and aggregators accountable to the NISO Data Quality Code of Conduct.
- ☐ Librarians should continue to educate researchers and administrators about the responsible use of citation and altmetrics for research evaluation purposes.
- ☐ Librarians should collaborate with institutional leaders to develop internal expertise to support the use of citation and altmetrics in ways that promote institutional values, rather than relying on commercial products that are expensive, provide metrics that create perverse incentives, and provide an incomplete picture of an institutions outputs and resulting impact.

Planning and Designing Academic Library Spaces

Of particular interest is the *Project Information Literacy Report on Academic Learning Spaces*. Researchers interviewed 49 librarians, architects, and consultants regarding 22 currently ongoing academic library space projects asking "what types of academic learning activities are new spaces intended to support, and how are these designs for learning achieved," how "the professional values of librarianship and architecture combine to inform space designs, and what challenges exist when planning and such designs," and "what best — and worst — practices have librarians and architects learned from the projects."[177]

Major findings include the prioritization of "flexible" spaces supporting student needs for collaborative and individual study. They tended to focus on students as library users with less concern for faculty or librarians, although most of them employed no formal process to accumulate user information regarding the students. They also gathered useful anecdotal information during tours of other libraries and benefited from communication with all constituents. When projects were completed, "formal evaluation metrics were rarely used" because of barriers including "logistics, time, energy, or available expertise." Some challenges included librarians' "lack of control over high-level decision-making," occasional clashes between architects' aesthetic preferences and librarians' functionality concerns, and project delays and cost overruns.[178]

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[176] NISO, 2016

[177] Allison J. Head, "Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants," A Project Information Literacy Report, December 6, 2016, 1, http://www.projectinfolit.org/uploads/2/7/5/4/27541717/pil_libspace_report_12_6_16.pdf.

[178] Ibid., 2–3.

Implications

- [ ] Librarians and architects can work together successfully to create useful student learning spaces.
- [ ] The relative lack of consideration for non-undergraduate student users should be addressed as libraries try to balance multiple patron needs and requirements, which may intersect and/or
- [ ] There are challenges in that alterations to traditional library space will most likely displace traditional physical collections and therefore, impact particular traditional users. Libraries must focus, therefore, on more ensuring access and providing enhanced services for these patrons and their research and teaching needs.

Libraries and Social Justice

To say that racial and social justice issues have been prominent in national life in the past few years would be an understatement. During the administration of the first African-American U.S. president, the Black Lives Matter movement arose from a number of complex societal factors crystallizing around the witnessing of deaths of African-Americans at the hands of police. Social media quickly spread reactions and dialog in the wake of each new tragic event. Separate from these horrifying events, sports personalities took a knee against systemic racism and justice issues entered popular culture through a runaway Broadway musical and a Superbowl halftime show. A noteworthy reaction to these tragic events and concerns, whether they involved racism, sexism, homophobia, or other oppressive forces, was intellectuals' work of providing historical context on these events in the form of syllabi for the public.[179] These syllabi collected extensive amounts of educational resources such as books, journal and newspaper articles, multimedia, fiction, poetry, primary source documents, and music using social media crowdsourcing and were often compiled with assistance from librarians.[180] Marcia Chatelain, assistant professor of history at Georgetown College, was perhaps the first to compile this type of syllabus following the death of Michael Brown, a young African-American, at the hands of police in Ferguson, Missouri.[181] Other well-known instances of this phenomenon included #CharlestonSyllabus,[182] created in the wake of the murders of nine African-American churchgoers by a white supremacist terrorist and since published as a book,[183] and the #LemonadeSyllabus[184] which provided context surrounding Beyonce Knowles'

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[179] Ellen C. Caldwell, "Teaching Trump: The Rise of the Crowd Sourced Syllabus," *JSTOR Daily*, December 1, 2016, http://daily.jstor.org/teaching-trump-rise-crowd-sourced-syllabus/.

[180] Chad Louis Williams, Kidada E. Williams, and Keisha N. Blain, eds., *Charleston Syllabus: Readings on Race, Racism, and Racial Violence* (Athens: The University of Georgia Press, 2016).

[181] Sociologists for Justice, "#FergusonSyllabus," *Sociologists for Justice*, 2014, https://sociologistsforjustice.org/ferguson-syllabus/.

[182] Chad Williams, Kidada Williams, and Keisha N. Blain, "#CharlestonSyllabus," *African American Intellectual Historical Society*, 2015, http://www.aaihs.org/resources/charlestonsyllabus/.

[183] Williams, Williams, and Blain, *Charleston Syllabus*.

[184] Candice Benbow, "#LemonadeSyllabus," May 6, 2016, http://www.candicebenbow.com/lemonadesyllabus.

Lemonade project, a statement about Black womens' experience. Public dialogue surrounding the syllabi was enabled by the use of Twitter hashtags such as #ColinKaepernickSyllabus, #OrlandoSyllabus, and #SyllabusforHAM (the Hamilton Syllabus).[185]

Within the library and information science profession, several voices called attention to a number of justice-related issues such as a continuing lack of diversity in library hiring[186] and microaggressions experienced by librarians of color.[187] Stories about built-in racial bias evidenced in seemingly-neutral technology were featured in the popular media as well. For example, racially biased search algorithms in Google such as the sexualization of Black girls and women and the criminalization of Blacks in search results[188] was the subject of many news stories which often quoted UCLA faculty member Safiya Noble, an expert in this area.[189] The reproduction and reinforcement of prejudice via Google's autocomplete search feature—which predicts what a search statement will be based on previous searches typed by millions of other users—was in the news,[190] as well as the "technological redlining" of the popular game Pokemon Go in which minority neighborhoods host few prize locations in this geographically-based game.[191] Other writers troubled the notion of neutrality in library collections and services and explored

[185] Eng Beng Lim, "#OrlandoSyllabus," *Bully Bloggers*, June 24, 2016, https://bullybloggers.wordpress.com/2016/06/24/the-orlando-syllabus/; Rebecca Martinez et al., "#ColinKaepernickSyllabus," *New Black Man (in Exile): The Digital Home for Mark Anthony Neal*, September 6, 2016, http://www.newblackmaninexile.net/2016/09/colinkaepernicksyllabus.html?m=1; Trevor Boffone, "#SyllabusforHAM: The Hamilton Syllabus," *Trevor Boffone, Ph.D.*, 2016, https://trevorboffone.com/2016/06/02/syllabus4ham-the-hamilton-syllabus/.

[186] Angela Galvan, "Soliciting Performance, Hiding Bias: Whiteness and Librarianship," *In the Library with a Lead Pipe*, June 3, 2015, http://www.inthelibrarywiththeleadpipe.org/2015/soliciting-performance-hiding-bias-whiteness-and-librarianship/; April Hathcock, "White Librarianship in Blackface: Diversity Initiatives in LIS," *In the Library with a Lead Pipe*, October 7, 2015, http://www.inthelibrarywiththeleadpipe.org/2015/lis-diversity/; Jennifer Vinopal, "The Quest for Diversity in Library Staffing: From Awareness to Action," *In the Library with a Lead Pipe*, January 13, 2016, http://www.inthelibrarywiththeleadpipe.org/2016/quest-for-diversity/.

[187] Jaena Alabi, "Racial Microaggressions in Academic Libraries: Results of a Survey of Minority and Non-Minority Librarians," *The Journal of Academic Librarianship* 41, no. 1 (January 2015): 47–53, doi:10.1016/j.acalib.2014.10.008.

[188] Latanya Sweeney, "Discrimination in Online Ad Delivery" (Data Privacy Lab: Harvard University, January 28, 2013), http://dataprivacylab.org/projects/onlineads/1071-1.pdf; Jessica Guynn, "'Three Black Teenagers' Google Search Sparks Outrage," *USA Today*, June 9, 2016, http://www.usatoday.com/story/tech/news/2016/06/09/google-image-search-three-black-teenagers-three-white-teenagers/85648838/.

[189] Safiya Umoja Noble, "Google Search: Hyper-Visibility as a Means of Rendering Black Women and Girls Invisible," *InVisible Culture: An Electronic Journal for Visual Culture*, no. 19 (October 2013), http://ivc.lib.rochester.edu/google-search-hyper-visibility-as-a-means-of-rendering-black-women-and-girls-invisible/.

[190] Claire Cain Miller, "When Algorithms Discriminate," *The New York Times*, July 9, 2015, https://www.nytimes.com/2015/07/10/upshot/when-algorithms-discriminate.html.

[191] Allana Akhtar, "Is Pokemon Go Racist? How the App May Be Redlining Communities of Color," *USA Today*, August 9, 2016, http://www.usatoday.com/story/tech/news/2016/08/09/pokemon-go-racist-app-redlining-communities-color-racist-pokestops-gyms/87732734/; Jeffrey Vagle, "Technological Redlining," *The Center for Internet and Society (Stanford Law School)*, July 19, 2016, http://cyberlaw.stanford.edu/blog/2016/07/technological-redlining.

libraries' situatedness in white supremacy and the colonizing impulse.[192] These voices called on academic librarians to critically examine how injustice is embedded and continued in every aspect of our individual and collective work.

Implications

- Achieving increased representation and de-marginalization of scholars of color in academia will require journal editors to examine their publishing practices and individual librarians' examination of whom they cite in their own scholarly work.
- New strategies will be required in order to hire and retain academic librarians in proportions that reflect the diversity of the student population and the American population at large.

Action-Oriented Research Agenda on Library Contributions to Student Learning and Success

Recognizing the need to demonstrate the value of academic libraries, ACRL formed a team to "develop an action oriented research agenda on library contributions to student learning and success," and to answer the following two research questions: "What are the ways that libraries align with and have impact on institutional effectiveness?" and, "How can libraries communicate their alignment with and impact on institutional effectiveness in a way that resonates with higher education stakeholders?"[193] After reviewing and coding "357 relevant readings" on library assessment, the team found that "librarians experience difficulty articulating their value to higher education administrators and other stakeholders, and do not appear to be included in discussions related to higher education outcomes, such as accreditation." Some frequently discussed topics, such as assessment and communication, are often "not empirically measured," and those that are use a small variety of methods, which may not "match the methods relevant to senior leadership."[194] The initial report suggests that academic librarians have trouble relaying their value to their institutions because they do not focus on topics important to "higher education administrators and decision makers."[195]

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[192] Chris Bourg, "Never Neutral: Libraries, Technology, and Inclusion," *Feral Librarian*, January 28, 2015; nina de jesus, "Locating the Library within Institutional Oppression," *In the Library with a Lead Pipe*, September 24, 2014, http://www.inthelibrarywiththeleadpipe.org/2014/locating-the-library-in-institutional-oppression/; Freeda Brook, Dave Ellenwood, and Althea Eannace Lazzaro, "In Pursuit of Antiracist Social Justice: Denaturalizing Whiteness in the Academic Library.," *Library Trends* 64, no. 2 (2015): 246–84, http://ezaccess.libraries.psu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=lxh&AN=113186747&site=ehost-live&scope=site.

[193] Lynn Silipigni Connaway et al., "Action-Oriented Research Agenda on Library to Student Learning and Success: Initial Report" (Chicago, IL: Association of College & Research Libraries, November 2016), 1.

[194] Ibid., 14.

[195] Ibid., 15.

Implications

- ☐ The demand for evidence-based decision-making necessitates that libraries have someone on staff who can not only work with data but plan what assessments and data are appropriate for telling the story of library value.
- ☐ The library profession should respond to the need for librarians with these skills through Master's level course-work and continuing professional development.
- ☐ Librarians and library administrators must continue to develop best practices and effective documentation to demonstrate value and be willing to share these practices and documentation cross-institutionally.

Conclusion

Academic libraries exist within the context of their specific institutions and the broader political, social, and regulatory environments. This year's Environmental Scan highlighted trends in funding and enrollment demographics that could affect the fiscal bottom line of colleges and research university libraries as well as change the populations that we serve. Other changes such as the Framework for Information Literacy in Higher Education, an increase in competency-based education, and social justice issues affect how libraries might connect with the values of academic departments to deliver instruction. The on-going evolution of scholarly communications and open access are expanding to include open science and open data movements; this cluster of trends has implications for libraries' involvement in curating research data, supporting open access, and providing services to their scholars in understanding the information publishing environment. All of the trends combine to affect library planning for collections and services and how libraries assess their success. Metrics and research evaluation continue to be a demand from funding agencies to campuses and from campus administration to libraries. Libraries and librarians must be prepared to communicate the Library's value in the higher education landscape by staying aware of the changes and priorities beyond their walls. The 2017 ACRL Environmental Scan and footnotes offer a start to understanding the challenges external trends and implications for action.

Appendix A: ACRL Research Planning and Review Committee 2016-2017

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