ASSOCIATION OF RESEARCH LIBRARIES

Library Impact Research Report

Understanding and Communicating Research Impact: The Needs of STEM and Health Sciences Faculty and Postdoctoral Researchers

Authors: Negeen Aghassibake, Lynly Beard, Jackie Belanger, Diana Louden, and Robin Chin Roemer

With additional support from: Steve Hiller and Maggie Faber

University of Washington Libraries

November 19, 2021

Association of Research Libraries 21 Dupont Circle NW, Suite 800, Washington, DC 20036
(202) 296-2296 | ARL.org

Abstract

This 2019–2020 project explored University of Washington (UW) faculty and postdoctoral researcher needs for understanding and communicating the impact of their work. The project focused on researchers in science, technology, engineering, and math (STEM) and health sciences fields. The project was designed to understand the challenges researchers face in this area, identify how participants in these fields define and measure impact, and explore their priorities for research-impact support. The project team at the UW Libraries conducted a survey and follow-up interviews to investigate these questions. Results suggest that early-career researchers in particular are interested in assistance not only in identifying metrics to demonstrate impact, but assistance with interpreting and contextualizing these metrics for promotion-and-tenure packages and funding applications. Researchers are also attempting to reach a variety of audiences (both scholarly and public) and face challenges in reaching different audiences and understanding their wider impact. There are currently gaps in support for researchers in this area, and many opportunities exist for helping researchers understand and communicate how their work makes a difference not only to scholarship in their fields, but also to policy, clinical practice, and wider public understanding of scientific and health issues.

Table of Contents

Introduction

This project, conducted by a team at the University of Washington (UW) Libraries in 2019–2020, was designed to explore faculty and postdoctoral researcher needs for understanding and communicating the impact of their work. The project focused on researchers in science, technology, engineering, and math (STEM) and health sciences fields. The project was designed to understand the needs and challenges researchers face in this area, identify how participants in these fields define and measure impact, and explore their priorities for research-impact support.

Research impact can be defined as "the extent to which publications" or other scholarly outputs are "read, discussed, used and disseminated inside and outside academia."[1]

Measurements of research impact can include traditional bibliometrics, such as citation counts and journal impact factor, as well as "altmetrics," such as, how often research is cited in social media, news stories, policy documents, or other gray literature. Faculty and postdoctoral researchers are asked to demonstrate the impact of their work in order to get academic positions, for funding applications, and for the promotion-and-tenure process. Supporting researchers in measuring impact has been a key trend in academic libraries over a number of years. While there is a great deal of literature on the subject of evaluating research impact, the project team was interested to explore where the UW Libraries could make the greatest impact in this area based on current needs and gaps in support, and to identify from the researcher perspective what is meaningful and valued in telling the story of the difference their research makes to a variety of audiences.

This project was not primarily an impact study designed to measure the difference UW Libraries services made to researchers. Instead, it aimed to provide peer research libraries with additional context and understanding for where libraries might continue to develop research-impact services to increase the value of their contributions to research productivity.

Why It Matters to Research Libraries

Over the past decade, research and academic libraries across North America, the UK, and Australia have developed programs to support researchers in understanding and communicating the impact of their work. Many libraries now provide services focusing on bibliometrics and altmetrics, and there are also ongoing wider conversations in academia about how research outputs should be measured, evaluated, and valued (see, for example, the Declaration on Research Assessment (DORA)[2]). As this work has become embedded in research life-cycle support offered by libraries, it is vital to understand how researchers understand impact and what they value and seek in this support. Understanding the perspectives of early-career faculty and postdoctoral researchers is especially important, both because the stakes are high in terms of establishing their careers and because their understanding of meaningful measures of impact will shape the future of this work in the academy. As Robin Chin Roemer and Rachel Borchardt note, librarians are well placed to

support research-impact efforts at their institutions for a variety of reasons: "librarians are…crucial connectors between faculty, departments and university administrators. They are used to telling stories to an academic audience, whether to faculty about the metrics administrators value for purposes of tenure and promotion or to administrators about the support that faculty need to apply for grants and perform essential research."[3]

This issue is also important for the University of Washington and the UW Libraries. There have been a number of conversations at the University of Washington in recent years about the changing nature of research and scholarship that include how impact is understood and measured. A 2018 report produced by the university's faculty governing body established a number of aspirational strategies for faculty and the institution, including "establish[ing] robust support for faculty-led community engaged, collaborative, interdisciplinary, and/or public scholarship, research, and teaching" and "formally recogniz[ing], valu[ing] and reward[ing] commitment to community impact within research, scholarship, teaching, and service."[4] Telling the story of the impact of research and scholarship conducted at the University of Washington is a key goal for the institution, as set out by UW President Ana Mari Cauce in a 2018 address to the university. In line with this institutional emphasis, a core set of goals in the 2018–2023 UW Libraries strategic plan is focused on "Advancing Research for the Public Good."[5] Specific goals include increasing support for the entire research life cycle and assisting researchers in demonstrating the impact of their scholarship.

Objectives

The objectives of this project were as follows:

1. To determine how the University of Washington Libraries can better meet the needs of early-career STEM and health sciences researchers seeking to measure and communicate the impact of their work
2. To understand the outcomes and impact of existing UW Libraries support for research impact in STEM and health sciences fields
3. To increase awareness of UW Libraries support for postdoctoral researchers
4. To identify from the researcher perspective what is meaningful and valued in telling the story of their work and the difference their research makes

Hypothesis

Our hypothesis was that there are currently unmet needs and gaps in support for UW researchers who seek to measure and communicate impact for purposes such as promotion and tenure and funding applications.

In order to explore this wider issue, the project team focused on three guiding questions:

- What are faculty and postdoctoral researcher needs relating to research impact? (promotion and tenure, grants, etc.)?
- What are the key challenges for faculty and postdocs in measuring, understanding, and communicating research impact for a variety of purposes and audiences?
- What are the gaps in support for early-career faculty and postdoctoral researchers in this area, and how might the UW Libraries partner with others on campus to address these gaps?

Literature Review

There is a substantial body of work in the library & information science and informatics fields focused on research-impact metrics, including bibliometrics, altmetrics, and other indicators of impact.[6] A number of works specifically discuss current and future library support for this work, including providing assistance to faculty with measuring research impact for promotion and tenure, as well as helping researchers establish academic profiles to raise the visibility and impact of scholarship.[7] Research into faculty needs and perceptions of library support for research-impact metric services includes that conducted by DeSanto and Nichols,[8] Bakker et al.,[9] Hollister and Schroeder,[10] and Thuna and King.[11] Hollister and Schroeder's study of education faculty frames library impact in faculty's own terms, aiming to "illuminate the perceptions of faculty concerning the impact of library support on their research productivity" and exploring "what constitutes research productivity among faculty."[12] In their study of senior faculty, Thuna and King identify a "significant gap in consensus between the authors' 'librarian view' of metrics and the faculty researchers' understanding"[13] and note that there are discipline-specific differences in the perception of research impact. Their research pointed to the "need to fill the gap between librarians and faculty researchers with examples of disciplinary best practices in the use of impact metrics."[14] He, Gerbig, and Kirby's 2019 study of dentistry researchers indicated that "From a list of eleven research impact assessment services, those that were ranked as having the most potential value for participants' research activities were research metrics training and assistance with identifying funding agencies. In comparison, altmetrics training and support services were ranked as having the least potential value."[15]

Methodology

This was a mixed-methods study utilizing quantitative and quantitative data. The quantitative approach, in the form of survey data, was selected in order to capture high-level trends in faculty and postdoc research needs, including in the area of research impact.

The qualitative approach, in the form of interviews, built upon this survey data to explore in depth some of the trends we identified in the quantitative phase. The initial plan was to interview three groups of researchers:

- Those who participated in a 2017 pilot study and/or attended one of the research-impact workshops developed out of the pilot
- Those who received support from liaisons in the form of consultations relating to demonstrating research impact for funding applications or promotion-and-tenure packages
- Early-career faculty and postdoctoral researchers who had not received direct research-impact-related support from the libraries

Ideally, we would have recruited additional participants from the 2017 pilot study to better understand how the assistance they had previously received contributed to their ability to demonstrate research impact. Only one participant from the previous study was interviewed for the 2020 project, however, so it is not possible to say whether or not the initial efforts at support offered during the pilot (though a customized research-impact report, workshops, and consultations) had an impact, or what that impact was.

In addition, the team began with the intention to develop programming, training, and support materials based on the survey and interview data. The goal was to undertake an additional stage in which we measured the impact of these interventions (for example, awareness of UW Libraries support increased number of faculty asking for assistance, increased use of tools to measure impact, increased use of metrics for funding applications, promotion and tenure, and on researcher websites). However, the dramatic changes to higher education and UW Libraries services as a result of the COVID-19 pandemic inhibited the development of additional library services that could have been piloted and evaluated in 2020–2021.

The project team initially planned to conduct in-person interviews. However, because of COVID-19, only four interviews were conducted in person, and the rest were conducted by phone or Zoom videoconferencing. Some interviews experienced technical difficulties, which may have affected the quality of participant responses. Technical difficulties also resulted in some recordings being unclear at points, which meant that content was unavailable in transcriptions and data analysis.

Key Performance Indicators

This study was exploratory and designed to understand researcher needs rather than measure particular objectives through key performance indicators.

Methods

Phase One of this project involved a spring 2019 survey distributed to faculty and graduate students in the STEM and health sciences fields, which included the following colleges/schools: environment, engineering, natural sciences, dentistry, medicine, nursing, pharmacy, public health,

and social work. The survey was designed to assess user satisfaction, importance, priorities, experiences with and perceptions of open-access publishing, and the impact of UW Libraries' contribution to research. Surveys were distributed to all UW faculty and graduate/professional students in all colleges and schools in STEM and health sciences fields at the Seattle campus. Of the 3,669 surveys distributed to faculty, 704 were returned (19% response rate). Of the 8,516 surveys distributed to graduate/professional students, 1,570 were returned (18% response rate). The faculty population also included postdoctoral research associates, and the graduate student population included master's, PhD, and professional doctoral students.

Phase Two of the project involved a series of 18 semi-structured interviews with faculty and postdoctoral researchers in health sciences and STEM fields. Interview questions are provided in **Appendix A**.

Participants were recruited through a variety of strategies:

- Suggestions from STEM and health sciences liaison librarians based on researchers they had previously worked with or whose work they knew
- Review of STEM and health sciences department and program websites to identify faculty who met criteria for early career (for example, Associate level)
- Review of postdoctoral scholar association and conference webpages
- Participants from a 2017 pilot study and/or those who had attended a subsequent workshop developed as a result of that pilot
- Inviting interviewees to suggest others in their departments who might be interested in participating

Participants were sent an email invitation signed by both the liaison and a member of the project team from the assessment department. A follow-up reminder was sent two weeks after the initial email if no response was received. As noted above, interviews were intended to be in person but were switched to telephone or video call as a result of COVID-19 and the shift to remote operations at the UW in March 2020.

The interviews were semi-structured. In addition to the interview questions, participants were provided in advance with a sample research-impact report for one of their articles (example in **Appendix B**). During the session, the interviewer provided an overview of the purpose and highlights of the report, and asked interviewees for questions and feedback. This was designed to test the usefulness of a tool library staff might use to assist faculty with research-impact questions.

Interviews were transcribed and analyzed using NVivo software. Codes for interviews were developed inductively: each project team member reviewed the transcripts and developed a list of core themes. The themes from project team members were compared to develop the codebook. The team then selected a sample of transcripts to test the draft codes. Coding was compared and the codebook was revised accordingly. Two members of the project team coded all the transcripts and compared efforts to generate the final results.

Resources Required

The project required two core team leaders (Belanger and Aghassibake) and additional project team members who provided input and expertise throughout the qualitative and quantitative work (Beard, Louden, Chin Roemer, Hiller, and Faber). The project team as a whole developed overall guiding questions, developed the methodology and interview guide, and assisted with interpreting results. The project leads shared responsibility for conducting interviews and notetaking. Disciplinary subject expertise and knowledge of research impact was provided by two liaison librarians (Beard and Louden) and another librarian with research interest in bibliometrics, altmetrics, and research impact (Chin Roemer). The research-impact report template was developed by Chin Roemer, who provided training for the team on how to generate reports for each interviewee. It was vital for the project to have a team that combined subject expertise (STEM and health sciences), domain expertise (research impact, altmetrics), and assessment expertise (qualitative and quantitative assessment methods, data analysis).

Data coding and analysis were conducted using NVivo software (two licenses and the collaboration module). While this was a useful tool for the volume of data generated by the interviews, it is not an absolute requirement for the project.

Findings

One of the important insights provided by the 2019 survey data relates to faculty and graduate student priorities for library services. In response to the question, "Which of the following library services would be useful to your work?", the top priorities for faculty overall were:

- Strategies for monitoring literature in their field (55%)
- Assistance with conducting literature searches/systematic reviews (54%)
- Support for assessing and communicating the impact of their work (41%)

For the 41% of faculty who indicated an interest in support for assessing and communicating the impact of their research, we asked a more detailed follow-up question about the types of research-impact support that might be useful. Assistance with citation metrics came up highest (81%), followed by communicating research to the public (61%) and journal impact factor (61%). In the 2016 faculty survey, assessing and communicating the impact of research also emerged as a priority (although we cannot compare 2019 and 2016 results because the categories in the service-priorities question changed significantly).

As a result of the 2016 survey results, we conducted small-scale assessments involving interviews with health sciences faculty members, as well as piloting and assessing workshops focused on research impact. Liaisons in the health sciences also support their individual departments in this area, the value of which was acknowledged in a handful of 2019 survey comments: "[Our librarian was] very helpful on an emerging project using citation metrics to assess our global productivity."

Other work in the UW Libraries in recent years has focused on emerging areas, such as digital storytelling, as methods to communicate research to a wider public, a key institutional priority for faculty and the university, as noted above.

Findings from the interviews indicate that researchers in STEM and health sciences are interested in understanding and communicating how their work makes a difference not only to scholarship in their fields, but also on policy, clinical practice, and wider public understanding of scientific and health issues. However, aspirations for representing different types of impact in more nuanced ways are often not aligned with institutional expectations. These findings are described in more detail below.

Support-Needs Overview

While some postdoctoral researchers mentioned getting support from their department or faculty mentor in learning how to understand and communicate research impact (including raising the visibility of their work through social media and other channels), there were a number of areas of need for early-career researchers. One area of need was support with increasing the visibility of their research, through both traditional and social media, including establishing social media profiles and the best ways of using social media for research visibility. Another area was finding, using, and integrating the best research-impact tools and measures to understand and communicate impact for their needs (such as, grants, promotion and tenure).

Some interviewees also mentioned needing support with incorporating and translating measures into brief snapshots about research impact and developing narratives around impact.

The majority of interviewees found the research-impact report useful, but also indicated the importance of going beyond providing counts to offering context for the meaning of metrics.

In addition, some interviewees mentioned the need to develop a shared understanding among other researchers and faculty in their disciplines about the meaning of impact metrics and appropriate ways to measure different kinds of impact. This appears to be especially important in light of demonstrating and evaluating impact in promotion-and-tenure processes and communicating the impact of interdisciplinary, public, and community-engaged research.

Open Access and Research Impact

A number of faculty and postdocs mentioned the relationship between making their scholarly work available through open access (including publishing in open-access journals and depositing preprints in repositories such as bioRxiv and ResearchWorks) and raising the impact and visibility of their work.

Three interviewees (faculty and postdocs) specifically mentioned using bioRxiv, a **preprint repository**, and one interviewee shared that “one thing I do to try and increase the impact is I

always post preprints on bioRxiv…usually at the same time that I submit for publication." One faculty interviewee discussed using ResearchWorks, the UW institutional repository, and adding links from their website, though they noted, "Sadly I think I was the only one who put things in ResearchWorks in my department, in my school." Two postdoctoral interviewees noted that they are aware of and interested in open access and using bioRxiv for preprints, but they have not explored further, in part because they are still in the early stages of their careers. One of those postdoctoral interviewees said that their lab had considered using bioRxiv without worrying about publication to "get the idea out there, the data out there, and then everybody can move on and do their own thing," but that it is new to their team and that they are still considering bioRxiv.

Four interviewees discussed **open access**, including the relationship between open access and impact. One interviewee noted that "as far as impact go[es], the more I can make it open access, the bigger, the better." Another interviewee recalled a presentation from the UW Libraries for their department on open access and stated, "I think our faculty need more of those presentations though. Some of the questions revealed misunderstanding about what open access is and that it's all predatory and things like that."

Only one faculty member expressed concerns about open-access publishing, citing worries about the rigor of the peer-review process, concerns about predatory journals, and the perceived lack of high-impact open-access journals.

Impact Measures and Tools

Faculty and postdoctoral researcher interviewees are using a variety of tools and approaches to understand research impact. However, a number of interviewees expressed challenges and questions about measuring and communicating impact, including ambivalence about impact measures.

Publishing in **high-impact journals** continues to be a key element in understanding research impact and visibility, and interviewees talked about what makes a journal "high impact" in a variety of ways, including journal impact factor specifically, "high citation indexes," and the reputation of the journal in the field. How journal reputation was determined was sometimes unclear to some of the interviewees. As one interviewee noted, "I actually haven't googled 'impact factor' in a long time with any of the journals…. It's just kind of a feeling…[like] 'Nordstrom is slightly nicer than Macy's.' I don't know how I'm judging that."

Eight interviewees discussed tracking and paying attention to **citations and downloads** for their scholarly work. There are some questions about what these metrics mean and how reliable they are. Two interviewees noted that citation metrics and impact factors could be "hacked" or "gamed," one of them stating, "I also recognize that there's a game to impact factors…. Journals just cite themselves over and over…. And then of course if you're very self-referential in your work you can also drive up citations."

Six interviewees discussed **h-index**. When discussing h-index, one interviewee noted that "all of those are riddled with a lot of, you know, 'Eh, yeah.... How good is this really? Is this really a good indicator? I think we can take that into consideration.' But as a researcher I love data, so the more data I have, the happier I am." However, another interviewee said that they "don't know how much the faculty review those kinds of things and really understand them" and that they think that "there needs to be an education element, not just for the people who are trying to report their h-index and such, but for people who are analyzing impact." They also expressed concern about using the h-index in evaluations, noting that "understanding that newer faculty are going to have lower h-indexes, but understanding why, really comprehending what that is—what the formula is—would be helpful for junior faculty to know that the senior faculty who are evaluating us understand. I think it would reduce people's anxiety."

A number of faculty and postdocs mentioned using **Google Scholar** to see citations of their work, with one interviewee noting that "it's also nice that I can go look at my profile and sort of see citation numbers being updated. That's especially nice for older work that I'm not as actively following as much, but just at a glance I can see how the impact is trending over time." Overall, a few interviewees used Google Scholar primarily as a citation-counting tool, with a couple of interviewees noting that they also used Google Scholar to discover new research. One interviewee who used Google Scholar mentioned, however, that their "faculty are not interested in Google Scholar counts, they want the Scopus, which is always lower, and I assume that's probably because Google Scholar is probably picking up log citations and all kinds of things, so that makes sense to me." That interviewee noted that they believe that Scopus is used instead of Google Scholar in their department's promotion-and-tenure process, and a few interviewees noted using **Scopus or Web of Science** to track citations.

Six interviewees mentioned using **ResearchGate** as a tool to make their work more visible. One interviewee shared using ResearchGate as "a way to at least get the work out to my group of colleagues I'm following...just to say I've got this article. Cause there's too many publications, it's impossible to track." One interviewee mentioned using ResearchGate for tracking downloads, noting that they believe that "having a certain amount of downloads is important as well."

While there was significant discussion of social media as a mechanism for visibility (see section below on social media), the use of **altmetrics** *per se* as a way to demonstrate and communicate impact was not widely noted. However, there were still mentions of using altmetrics from four interviewees, with one sharing that "Altmetric is probably the place that we follow primarily, if you will. And I think that's the one that we track to get a sense of what's working or what's not."

While the tools and methods above are some of the ways in which interviewees track their research metrics, several interviewees questioned the **meaning of these measures**, with three interviewees specifically noting the "bean counting" in academia. One interviewee expressed, "It's not about the quality that you publish. It's just how many publications you have. And so sometimes having a ton of papers, a ton of citations in and of itself isn't necessarily a measure of impact." They

went on to note, however, that even though they had "kind of over time placed less value on that," they "recognize [metrics] as still on my list of things I guess I use to judge my own work."

Audiences

Throughout the interviews, faculty and postdoctoral researchers expressed the desire to connect with a variety of audiences and to have an impact not just on their scholarly field, but also on clinical practice, policy, and the wider communities with which they engage.

Academic Audiences

Some interviewees shared challenges in connecting with academic audiences either within or outside of their research areas, particularly those in more **interdisciplinary fields.** One aspect of being able to communicate research with academic audiences was the need to **demonstrate impact for promotion-and-tenure processes**. Interviewees whose research areas were outside of their departments' "traditional" research areas expressed concern that colleagues reviewing their promotion-and-tenure packages would not recognize the value or impact of their publications (whether based on publication venue, metrics, or other factors). An interviewee shared one way that they attempt to "translate" their research is by "recogniz[ing] the impact factor of the journals [I'm] publishing in and documenting that. Because [I'm] sure that a lot of the [departmental] professionals, instructors, researchers that are my colleagues don't know those journals that I'm publishing in." They also noted that they had never published in a journal directly in their field, "[w]hich…could be problematic for me as well."

One faculty member noted the concern that "the only things that 'count' with regard to promotion and tenure are peer-reviewed articles," and that other publication venues or methods of disseminating their research (specifically mentioning news articles and community forums as examples) "aren't necessarily reviewed."

Non-academic Audiences

Writing for and disseminating research to a **non-academic audience** arose in several interviews in the context of the potential for practical application of research results and engaging with the general public. Some interviewees who reported an interest in sharing their work outside of academia also noted a desire to implement their research in professional settings, such as in clinical practice. One interviewee cited "the potential for things that I discover to be translated into treatments that help people" as a motivation for their work and that it is "fun to be able to communicate that to a broader audience." Concerns about reaching these audiences (and using various dissemination methods to do so) were closely tied to questions of understanding the impact of research beyond a contribution to the scholarly conversation. This manifested as both a question of impact on different audiences and measuring the impact of work aimed at non-academic audiences.

Another interviewee expressed concerns with reaching broader audiences, stating that "academia is just so focused on getting publications out and getting your numbers out, that it's sometimes lost 'Is what you're doing actually useful? Does it actually matter?' It's like, 'Yes, the data looks cool and it's publishable and you get another paper and you might get some citations out of it.' But will it ever touch somebody?"

However, interviewees also expressed challenges in **reaching multiple audiences outside of academia**. One challenge was in writing for the public, the media, and other non-academic audiences. An interviewee shared: "You know, I'm new to writing for the public. I'm new to writing for media outlets, etc. That was the moment when I could have used more support and guidance. We've been asking, as junior faculty, for workshops, both on how to write for policymakers—because that's certainly not how we're trained, to be concise and how to write a good report. And also how to write for media and to engage with that."

When discussing this challenge, one interviewee mentioned that they "try and not do work that is extremely esoteric" so as to make it easier for the general public and patients to understand the research. Another shared that they participate in competitions where they create short videos on their research that are designed to be accessible for non-academic audiences, and another explained that they "love any podcast format" because "getting invitations on podcasts puts that work into a completely different context and audience that you're disseminating to." Despite different approaches, reaching non-academic audiences (and the related issues of how to measure impact on these audiences) was a recurring discussion throughout several interviews.

Media

Media, including news media, was brought up by nearly every interviewee as a way of reaching a general audience and increasing the impact of their research. One interviewee described the "mainstream media [as a place] where the public is more likely to see [research]." However, concerns with **publishing in general media** were raised, particularly around how to write for and get accepted for publication. One of the interviewees shared, "UW, I think, had a really big impact when they did pick up an article or some work I was doing…the editor…she loved it, she picked it up, she did this whole plan. But that was a team of like three or four people that made a conscious effort to send out the link, say some things, and then somebody else would pick it up. But it was a planned [effort for] somebody to pick it up. You know, so they had this strategy." The support necessary for publishing in news media was a key issue, including writing for newspapers. One interviewee mentioned that at their former university, there was a department that "translate[d] many of their papers into lay terms…and I'm like, 'well that would be great,' if we had somebody translating my research in a way that would make it easier to share with more people."

Social Media

One theme that emerged from almost all interviews was the importance of social media (particularly **Twitter**) for **increasing visibility and impact, forming networks, and the**

discovery of research. There were a variety of concerns expressed about Twitter, even among those who actively used it for professional purposes.

Nearly all interviewees discussed Twitter, and nine mentioned that they use Twitter to raise the visibility and impact of their work and discover new research. One interviewee stated that "having a professional Twitter is a way of pushing content out," though they acknowledged the "process of learning how to use Twitter, be good at tweeting…[l]earning the high-impact hashtags and all that sort of thing." A faculty member noted that using Twitter was a way to get on to "shortlists" to give seminars and reach potential postdoctoral researchers.

Twitter was also used by some interviewees as a way to discover new research, and one interviewee shared, "it's nice because I have colleagues that are kind of in the same field, but not close enough that I would normally read their papers. But if they tweet about it, then I'll at least look over the abstract and then I feel a little bit more well read, more well rounded, I guess."

There was also concern that Twitter may misrepresent research or lead to research being taken up in incorrect ways. One interviewee noted:

> I had a fellow, a surgical fellow, tell me "I get most of my information from Twitter" but a lot of times they form their opinion based on the 240 characters. And so they [don't] read the whole article. And so it should give you some great pointers about making sure it's open-access so that you're giving them a link to more information than just the 240 characters…people [don't] do [due] diligence and that terrifies me…. But we get to a point where people only read as far as 240 characters, and how do you put in the context and depth of information that somebody needs to get out of the 7 pages, and that's not even the full 200-page report that may really give all the details of strength and limitations. So I think it's changing how we think and how we distill information down….

In addition to concerns of misrepresentation, one interviewee said that they "do more following of people who do research that I like than trying to put out content." One interviewee expressed concern at research that is shared through Twitter being manipulated by unintended audiences, such as white nationalists who "weaponize" research for their own agenda. These issues accompanied the benefits of using social media, such as Twitter, to raise research impact.

Data

Project data consists of survey results and interviews. The survey data was collected using Qualtrics. The survey required staff time to develop questions, invite participants, and analyze the results. It also required a subscription to the Qualtrics software. Qualitative data was gathered through interviews, which were recorded through either a recording device or Zoom software recording and saved as audio files. The interviews were manually transcribed into separate Microsoft Word documents following a set of internally created best practices for transcription

consistency between transcribers. The raw data include confidential and identifiable information and was deleted at the end of this project in June 2021.

The interviews required staff time to identify potential interviewees, draft invitations, and conduct interviews, which spanned four months, from January through April 2020. The interviews were transcribed by student hourly employees over approximately 60 hours, and the data were analyzed by two members of the project team using NVivo (with Collaboration Cloud).

One of the obstacles that arose when gathering the data was the lockdown and closing of the physical university campus due to COVID-19. In-person interviews had to be shifted to phone or online (using Zoom) within a few days. However, despite the logistical challenges, the team was able to conduct all of the interviews through alternative methods.

Value

The project fulfilled the objectives of the UW project team in providing a more detailed understanding of early-career faculty and postdoctoral research needs in the area of research impact. The use of the research-impact report as a discussion tool in the interview was a particular success: it enabled the team to provide interviewees with a concrete example of how the UW Libraries could support them and raised awareness of the various measures and interpretations of research impact. It also helped to make more concrete what interviewees really wanted, not just metrics themselves, but assistance with interpreting and translating those metrics into meaningful stories about their work.

Beyond fulfilling the objectives of this project, another value of this work was building stronger relationships with postdoctoral researchers and learning more about postdoctoral associations at the UW. The growth of this relationship can help the libraries better understand postdoctoral researcher needs and develop research-impact support services that meet those needs.

The potential value of this project to other research libraries may lie in the way that it helps to add nuance to the types of research-impact support needed by early-career researchers. While there has been much focus in the past on tools and metrics, there is a clear need for skills in making meaning of the metrics and for communicating research to a variety of audiences. In the context of a great deal of recent questioning of traditional metrics and their role in academia, the insights provided by this project may enable libraries to consider other ways of providing value to faculty, which may translate to a consideration of additional impact measures for libraries.

Lessons Learned

Outreach to faculty interviewees was built on established relationships between liaison librarians and their departments and schools. However, reaching out to postdoctoral researcher interviewees relied on the discovery of postdoctoral organizations at the UW that are sometimes outside of the more established methods of outreach by liaisons. This required research into postdoctoral associations and labs at the UW where postdoctoral researchers often work.

This project would have been strengthened by partnerships with stakeholders, such as the University of Washington Office of Research and the Office of Postdoctoral Affairs. While there is an existing relationship between some librarians and the Office of Research, those individuals were not part of the project team. As any sustainable efforts to extend this work to support research impact will involve multiple stakeholders, the project team will need to connect to share results and identify potential areas for cross-campus collaborations.

The development of the research-impact reports required further training not only on the structure of the report itself, but in-depth learning of research-impact measures such as h-index, field citation ratio, journal impact factor, etc. This training was necessary in order to be able to answer questions about the research-impact report during the interview and contextualize the discussion around impact measures in the analysis.

Recommendations for Future Research

This project was originally designed to have additional components following on from the interviews in spring 2020. Data from the surveys and the interviews was intended to inform training for UW librarians and to create additional infrastructure in the organization for expanding research-impact support (tools and guides that could be used by researchers themselves). These additional approaches would have been assessed in terms of their effectiveness and impact on researcher needs, which would have provided a greater understanding of the contribution libraries can make in the area of research impact. This aspect of the project was put on hold with the shift to remote operations during the COVID-19 pandemic. Future research should focus on using insights from this report to experiment with new services and resources for early-career researchers. Do faculty find value in assistance with translating metrics into narratives, and who do they look to for this assistance, for example?

In addition, given the evolving landscape of research dissemination due to social media, it may be useful to update this data in the future with a stronger focus on the use of social media platforms and tools. Additional research into the needs of postdoctoral scholars can help inform impact support for those users. Postdoctoral scholars often have a unique relationship with the institution because they typically did not attend as students and do not have long-term commitments like

many faculty. Further research into their ways of working and research-impact needs can uncover more targeted support strategies.

Future research can also focus on translating findings from this work into measures of library contributions and value. Based on what researchers value—and how they understand the meaning of research impact for their disciplines and career stages—how can research libraries demonstrate their contribution to this critical area of research support? In the 2010 *Value of Academic Library* report, suggested measures included whether libraries contributed to faculty promotion-and-tenure documentation.[16] In future, additional measures might include partnerships with offices of research and others on campus, and how libraries help researchers not just with accessing metrics but translating those metrics into stories for grants, promotion and tenure, media communication, and wider public engagement. Lastly, there is scope for understanding how libraries contribute to increasing the visibility of research by promoting open-access publishing and helping faculty and postdocs establish social media and other online profiles. This may translate to a consideration of additional impact measures for libraries: were researchers able to use skills developed during a library workshop on digital storytelling to communicate their research to a wider audience? Are libraries able to increase research impact by assisting with open-access publishing?

Appendix A: Interview Questions

A. Opening: Research Area/Activity Overview

1. Broadly speaking, describe your research area of interest.
   - What is your primary research question or objective?
   - How long have you been researching this area?
2. Describe for me the current project or projects you're working on.
   - What do you expect will be some of the outcomes or "products" from this project?

B. Communicating Research (Scholarly Communication/Publishing)

1. How would you describe the target audience for your research? Who are you trying to reach?
   - *As needed***:** How does that vary by project? For example, the project you mentioned previously?
2. Where and how have you communicated your research from this project?
3. What are the most important factors you consider when deciding how and where to communicate your research?
   - *As needed*: for example, convenience, timeliness (how quickly people will hear about the research), impact?
   - How do you consider "impact" when deciding about how and where to communicate your research? How do you define "impact"?

C. Research Impact: Current

1. I'd like to talk more specifically about impact now. Generally speaking, what are your greatest needs for showing the impact of your work (that is, how your research is used or where it is being discussed)?
   - How are you required to demonstrate the impact of your research for your promotion & tenure process, for example?
   - Beyond P&T requirements, what are your other needs for understanding the impact of your research (e.g., applying for grant funding)?
2. If and when you are interested in looking at the impact of your research, what processes or tools do you use?
   - Do you use any specific tools to help you with this? (e.g. Google Alerts, twitter mentions)
   - How did you learn to do this?
     - What support do you receive for this? (e.g., library, departmental)
   - Thinking about an article you have published in the past 2-3 years, how do you measure the impact this article made…
     - In your field? Outside of academia (e.g., media coverage, influence on policy)?

D. Research Impact: Support (questions only used if interviewee had used library support in this area in the past)

1. Tell me about what support you received (consultation with a librarian, attended a session).
    - What prompted you to reach out to your liaison/attend the session?
2. What did you learn from this support—what did that enable you to do that you weren't able to do previously?
    - Do you still use the tools/strategies you learned? If so, in what ways?
3. What contribution, if any, has this support made to your research (your ability to be an effective researcher)?

E. Research Impact Report

1. Did you have any questions or thoughts about this report? In what ways does the report meet your needs for understanding and communicating research impact? Are there ways the report could be made more useful?

F. Research Impact: Future

1. Moving ahead, what do you hope to do to increase the visibility and impact of your research?

Appendix B: Research Impact and Attention Report

Each University of Washington interviewee received a sample impact report on one of their publications. Interviewers introduced the report during the interview and solicited feedback about its usefulness for promotion and tenure, grant applications, and other purposes.

Researcher Name: [FirstName LastName]
Title/Department: [title, department/lab]
Research keywords: [MeSH terms, abstract keywords, author-supplied keywords]

Simplified keywords: [3–4 from MeSH terms, abstract keywords, author-supplied keywords]
Profile URL: [department profile URL if possible]

For further assistance with research impact questions, please contact [name] at [email address].

Representative Publication:

[citation, link the DOI]

Summary:

[If high impact:] [This is a highly impactful article and has drawn significant attention from other scholars. It has a field citation ratio of [#] and has performed better than similarly-aged articles in its subject area.]

[If social media attention:] [This article has drawn noticeable attention on social media.]

[If attention in news:] [This article has drawn noticeable attention in news stories.]

Citations[1]

- Google Scholar ()
- Google Books ()
  - Article title (exact) [link] found inside [#] books.
- Scopus () → Citation benchmarking: [percent] percentile in [field(s)]

[1] Numbers indicate current citations that could be identified within the bounds of each resource. **Please note that no single source can provide a definitive answer to the # of citations for a work,** and that citations listed here may not include uses such as inclusion in a teaching course, or use by an informal online publication.

    - Shows how citations received by this document compare with the average for similar documents. Takes into account: date of publication, document type, and disciplines associated with its source.
    - Field-Weighted Citation Impact: [field-weighted citation impact] Shows how well this document is cited when compared to similar articles. A value greater than 1.00 means the document is cited more than expected. What is Field-weighted Citation Impact?
- Web of Science ()
    - Journal Citation Reports Impact Factor score (20__): [JIF] → JCR IF: average # of cites for journal content after 2 years.
- PubMed Central ()
- ResearchGate ()
- Dimensions [link] ()
    - [#] recent citations (last 2 years), [#] field citation ratio, [#] relative citation ratio
    - Field Citation Ratio indicates the relative citation performance of a publication when compared to similarly-aged articles in its subject area. A value of more than 1.0 indicates higher than average citation.
    - Relative Citation Ratio (RCR) indicates the relative citation performance of a publication when comparing its citation rate to that of other publications in its area of research. A value of more than 1.0 shows a citation rate above average.

Readers/Views/Downloads

- Mendeley ([#] readers / [#] citations):
- ResearchGate ([#] reads)
    - How ResearchGate measures Reads
- Publisher website [link] ()

Social Media[2]

- Twitter [Altmetrics link] ([#] tweets from [#] users)
- Facebook [Altmetrics link] ([#] public wall posts from [#] users)

Secondary Outputs

- Blog posts [Altmetrics link] ()
    - [blog name with link], [blog name with link], ...

[2] To discover a work's social media mentions, we recommend starting with the free Altmetric Bookmarklet (https://www.altmetric.com/products/free-tools/bookmarklet/)

- News [Altmetrics link] ()
  - [name with link], [name with link], ...
- Patents [Altmetrics link] ()
  - [name year with link], [name year with link]
- Policies [Altmetrics link] ()
  - [organization/name/year with link], [organization/name/year with link], ...
- Other
  - [F1000Prime?]
  - [Altmetrics Attention Score?]

Endnotes

[1] Arian Abdulla, "Research Impact Evaluation" (slide presentation, October 29, 2019), https://hdl.handle.net/1813/69487.
[2] Declaration on Research Assessment (DORA) website, accessed October 13, 2021, https://sfdora.org/.
[3] Robin Chin Roemer and Rachel Borchardt, *Meaningful Metrics: A 21st-Century Librarian's Guide to Bibliometrics, Altmetrics, and Research Impact* (Chicago: Association of College and Research Libraries, 2015), 4, https://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/9780838987568_metrics_OA.pdf.
[4] University of Washington Faculty Senate, *UW Faculty 2050*, University of Washington, 2018, https://s3-us-west-2.amazonaws.com/uw-s3-cdn/wp-content/uploads/sites/71/2014/05/22124316/Revised.UW-Faculty-2050.2018..pdf.
[5] "2018–2023 Strategic Plan," University of Washington Libraries, accessed October 13, 2021, https://www.lib.washington.edu/about/strategicplan.
[6] Cassidy R. Sugimoto and Vincent Larivière, *Measuring Research: What Everyone Needs to Know* (New York: Oxford University Press, 2018); Blaise Cronin and Cassidy R. Sugimoto, eds., *Beyond Bibliometrics: Harnessing Multidimensional Indicators of Scholarly Impact* (Cambridge, MA: MIT Press, 2014); Roemer and Borchardt, *Meaningful Metrics*.
[7] Marta Bladek, "Bibilometrics Services and the Academic Library: Meeting the Emerging Needs of the Campus Community," *College & Undergraduate Libraries* 21, no. 3–4 (2014): 330–44, https://doi.org/10.1080/10691316.2014.929066; Steven Braun, "Supporting Research Impact Metrics in Academic Libraries: A Case Study," *portal: Libraries and the Academy* 17, no. 1 (January 2017): 111–27, https://doi.org/10.1353/pla.2017.0007; Lisa M. Given, Wade Kelly, and Rebekah Willson, "Bracing for Impact: The Role of Information Science in Supporting Societal Research Impact," *Proceedings of the Association for Information Science and Technology* 52, no. 1 (2015): 1–10, https://doi.org/10.1002/pra2.2015.145052010048; Brenna Helmstutler, "Taking Research Services to the Next Level: A Case Study of Implementing a Scholarly Impact Outreach Program for Faculty and Graduate Students," *Journal of Library Innovation* 6, no. 2 (2015): 96–104, https://scholarworks.gsu.edu/univ_lib_facpub/119/; Dean Hendrix, "Tenure Metrics: Bibliometric Education and Services for Academic Faculty," *Medical Reference Services Quarterly* 29, no. 2 (2010): 183–89, https://doi.org/10.1080/02763861003723416; Amy M. Suiter and Heather Lea Moulaison, "Supporting Scholars: An Analysis of Academic Library Websites' Documentation on Metrics and Impact," *Journal of Academic Librarianship* 41, no. 6 (November 2015): 814–20, https://doi.org/10.1016/j.acalib.2015.09.004.
[8] Dan DeSanto and Aaron Nichols, "Scholarly Metrics Baseline: A Survey of Faculty Knowledge, Use, and Opinion about Scholarly Metrics," *College & Research Libraries* 78, no. 2 (2017): 150–70, https://doi.org/10.5860/crl.78.2.150.
[9] Caitlin Bakker, Jonathan Bull, Nancy Courtney, Dan DeSanto, Allison Langham-Putrow, Jenny McBurney, and Aaron Nichols, "How Faculty Demonstrate Impact: A Multi-institutional Study of Faculty Understandings, Perceptions, and Strategies Regarding Impact Metrics," in *Recasting the Narrative: The Proceedings of the ACRL 2019 Conference, April 10–13, 2019, Cleveland, Ohio*, ed. Dawn M. Mueller (Chicago: Association of College and Research Libraries, 2019), 556–68, https://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2019/HowFacultyDemonstrateImpact.pdf.
[10] Christopher V. Hollister and Robert Schroeder, "The Impact of Library Support on Education Faculty Research Productivity: An Exploratory Study," *Behavioral & Social Sciences Librarian* 34, no. 3 (2015): 97–115, https://doi.org/10.1080/01639269.2015.1062584.
[11] Mindy Thuna and Pam King, "Research Impact Metrics: A Faculty Perspective," *Partnership: The Canadian Journal of Library and Information Practice and Research* 12, no. 1 (2017), https://doi.org/10.21083/partnership.v12i1.3906.
[12] Hollister and Schroeder, "The Impact of Library Support," 98.
[13] Thuna and King, "Research Impact Metrics," 18.
[14] Thuna and King, 18.

[15] Helen Yueping He, Madeline Gerbig, and Sabrina Kirby, "Needs Assessment for Improving Library Support for Dentistry Researchers," *Journal of the Medical Library Association* 107, no. 3 (2019): 356, https://doi.org/10.5195/jmla.2019.556.
[16] Megan Oakleaf, *The Value of Academic Libraries: A Comprehensive Research Review and Report* (Chicago: Association of College and Research Libraries, 2010), https://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/value/val_report.pdf.