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Research Impact Metrics: A Faculty Perspective

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Abstract

With an increasing focus on scholarly communications in academic libraries, librarians are struggling with how best to support faculty with the location, interpretation, and appropriate use of metrics. Very little has been written about the faculty researcher perspective on metrics and, as a result, librarians may have a deep knowledge of the tools but have a more limited understanding of the users' viewpoint. Seventy-nine senior research faculty who were five or more years post-tenure were interviewed. Faculty from the Humanities, Social Sciences and Sciences were all invited to participate. Each interview consisted of nine questions relating to how the faculty understand and use impact metrics in their academic life. Responses were varied to all of the questions and were tied closely to the disciplinary fields of the research faculty interviewed. A large majority of the interviewed faculty viewed the library as a key resource for getting more information relating to metrics. This research reveals a need to fill a gap between librarians and faculty researchers with examples of disciplinary best practices of metrics use, as well as product information as pertains to impact metrics.

Keywords

faculty perspective; impact metrics; research metrics; research faculty

Introduction

Impact metrics have their roots in a pre-digital world but have developed into many forms through the introduction of computing and the Internet. Although the more well-known metrics, such as impact factor and h-index, have long been the focus of use by researchers, in recent years there has been an explosion in the number of new metrics, including SNIP (Source-Normalized Impact per Paper), CiteScore, altmetrics as well as new initiatives like Snowball Metrics, adding to an already complex and competitive assessment environment. In his overview of the metrics “ecosystem”, Van Noorden (2010) highlighted the speed and sophistication of the metrics for assessing productivity and impact across the sciences and he alluded to the use of alternative metrics (altmetrics) for tracking beyond citations. Altmetrics build on the traditional metrics through the inclusion of social media and diverse forms of scholarly output, including datasets and digital projects (Priem, Piwowar, & Hemminger, 2012). With the National Information Standards Organization (NISO) initiative to standardize altmetrics (National Information Standards Organization, 2016) and their addition to the collection of assessment metrics, a highly complex field of impact metrics presents itself to faculty researchers who are competing for limited funding and are required to provide evidence of scholarly impact (Braun, 2017) and to librarians wishing to provide faculty with expert service and advice.

Roemer and Borchardt (2015) provide a useful categorization of impact metrics into four levels: individual contribution level metrics, venue-level metrics, author-level metrics, and institutional-level metrics. Citation data forms the basis of these calculations and, to different degrees, there are controversies surrounding each of them. The three principal commercial sources of citation data are Thomson Reuters’ Web of Science, Elsevier’s Scopus, and Google’s Google Scholar. The most accurate method for determining how often an article has been cited is to access “the references of all works of scholarship, including those that have never been indexed, have not been digitized, or are not electronically accessible” (Roemer & Borchardt, 2015, p.34). However, the citation data available from the three principal sources is inherently limited in coverage so an accurate assessment is not truly possible.

Of the range of metrics that record citation at the journal level the most commonly used is impact factor. Launched in 1975 by Eugene Garfield, founder of the Institute for Science Information (ISI) as part of the then new Journal Citation Reports (JCR), impact factor is a ratio “between citations and recent citable items published (Clarivate Analytics, n.d.). As described in the 2012 San Francisco Declaration on Research Assessment (DORA), impact factor has multiple problematic “deficiencies”: “citation distributions within journals are highly skewed”; “the properties of the Journal Impact Factor are field-specific”; “it is a composite of multiple, highly diverse article types, including primary research papers and reviews”; it “can be manipulated (or ‘gamed’) by editorial policy”; “data used to calculate the Journal Impact Factors are neither transparent nor openly available to the public” (American Society for Cell Biology, 2012). These are not new criticisms. Starting as early as 2008, Elsevier has been working on measures of journal impact, e.g., SNIP and SCImago Journal Rank

(SJR) (Huggett, 2013) and the more recent CiteScore to address these concerns (Van Noorden, 2016).

The principal author-metric is the h-index, a calculation developed in 2005 by Jorge E. Hirsch (Hirsch, 2005). The h-index “is calculated by using the number of articles an author has published to date (h) to determine a citation count threshold, which the author’s articles must meet or pass over (also h) to be included as part of the index” (Roemer and Borchardt, 2015). Once again the data source is the critical component as it is essential to the accuracy of the count. An author’s h-index may differ when generated using data from Scopus, Web of Science or Google Scholar (Alonso, Cabrerizo, Herrera-Viedma, & Herrera, 2009). Criticisms of the h-index have included the following, the h-index does not decrease even if productivity does, there is no advantage to researchers with a few highly cited papers, and career length is a variable that is not accounted for (Alonso, Cabrerizo, Herrera-Viedma, & Herrera, 2009; Norris & Oppenheim, 2010). To address these concerns, numerous modifications have been made to the metric but the accessibility and relative simplicity of the h-index has contributed to its popularity with researchers.

With the increased focus on faculty knowledge of scholarly communication in academic libraries (e.g. Open Access publishing, including Dawson, 2014 and McDonald, Gibson, Yates, & Stephenson, 2016), academic librarians continue to grapple with how best to support faculty with the interpretation, location, and appropriate use of types of metrics. Research has described approaches that academic librarians can and do use to address the bibliometric needs of faculty (Corrall, Kennan, & Afzal, 2013; Hendrix, 2010; Suiter & Moulaison, 2015). Although librarians may have an increasing need to be more active in this area of support, to be effective in their work they require a solid understanding of the faculty perspective of metrics, a perspective that may or may not match their own. The professional engagement of librarians in this area of service and research has attracted significant attention in the Library and Information Science literature, but very little has been written about the individual faculty researcher perspective (DeSanto & Nicholson, 2017, “Literature Review,” p.152). One notable exception is the 2010 poll conducted by *Nature* to assess its readers’ exposure to, and opinion of, metrics and how they are used in their institutions or departments. It should be noted that, of the 150 who responded, 28% lived in the United States, 40.7% live in Europe and only 3.3% live in Canada (Abbott, Cyranoski, Jones, Maher, Schiermeier, & Van Noorden, 2010). However, aside from this poll there is little information and librarians who know the tools may be planning services with limited understanding of the users of the tools.

Adding to the complexity, disciplinary assessments focus on different approaches to the use of metrics and as a result, lead to significant debate across disciplines regarding the strengths and weaknesses of each indicator. Disciplinary differences in metric use patterns are often attributed to the lack of robust data. For example, the lack of citation data for books is a significant gap for humanities researchers who are committed to that format (Wolff, Rod, & Schonfeld, 2016, p. 41). While scientists routinely use metrics for

a range of administrative decision-making and funding requests, humanists are less willing or able to do so with confidence.

The outcome of Corral, Keenan, and Atzal's (2013) survey of library bibliometric and data support activities in academic libraries highlighted an increase in activities supporting impact metrics, including instruction, grant writing and other areas of the faculty research enterprise (p. 666). This maps to the authors' personal experience with faculty as there has been a gentle increase in interest for supports in these areas since 2011 and this increase was one of the primary drivers for this research project. The other factor contributing to this research was an interest in whether perceived notions of what faculty researchers did and did not know (or want to know) mapped to the reality of the situation.

The purpose of this research was to reveal how senior faculty at the University of Toronto Mississauga understand and use impact metrics as part of their academic life and to assess the most effective role for the library in supporting them. The faculty researchers interviewed, senior researchers at a large research-intensive institution, have a deep knowledge of research environments as well as the complexities of day-to-day academic operations. Many work as part of large international teams on highly competitive funded projects, while others work more independently in their areas of specialty. As well, because they have been faculty members for a longer period of time, they would have had the possibility of more exposure to the changes in research metrics and thus provide the best foundation for this analysis.

Methods

Ethics clearance for this study was obtained from the University of Toronto (Protocol Reference #28009).

Environmental Context

The University of Toronto is a large Medical Doctoral University in Toronto, Ontario, Canada. It is composed of three campuses, St. George, Mississauga, and Scarborough. In 1967 the University of Toronto Mississauga (UTM) site was established as the western campus of the University of Toronto and is now located in the City of Mississauga. It is the second largest division of the University of Toronto with 13,500 undergraduate students and 600 graduate students (University of Toronto Mississauga, 2017). The University of Toronto Mississauga campus had 231 tenure stream faculty researchers as of September 2014 (University of Toronto, 2015, p.72). Many of the campus faculty are cross appointed for teaching and research to the other University of Toronto campuses.

Participant Selection

For the purpose of this study, senior faculty were defined as those who were five or more years post-tenure (tenure received between October 2012 and September 2013).

A scan of departmental websites and conversations with liaison librarians were conducted to identify eligible participants. One hundred and thirty-seven faculty researchers from 16 departments were identified as being five or more years post-tenure. Identified faculty researchers were sent a casual but humorous email invitation to meet with one of the two authors to discuss their perspective on research metrics. The incentive was a beverage of their choice. Further correspondence revealed that 15 of these faculty researchers did not meet the inclusion criteria for length of time post-tenure so the final pool of eligible research subjects decreased to 122. Seventy-nine of the 122 or approximately 65% of those who qualified agreed to be interviewed. This accounts for 53% of the total tenure stream faculty researchers at the University of Toronto Mississauga campus.

The two authors conducted semi-structured interviews over 12 months from October 2012 to September 2013. Semi-structured interviews are useful for gaining a detailed picture about knowledge and perceptions of a particular topic and offer more flexibility than surveys, questionnaires and structured interviews (Smith, 1995). No time constraints were placed on the interviews. Individual interviews ranged in length from 3 to 38.5 minutes, with a mean of 10.25 minutes per interview. As part of the research was to determine each respondent's personal understanding of the concept of impact metrics, no definitions, guidance or interview questions were shared prior to each interview. Each author conducted a portion of the interviews and all of them were conducted face to face.

Prior to each interview, participants were asked to sign a informed consent form, which described how their data would be used and how their privacy would be protected. One participant requested that the interview not be recorded. All others were recorded. Each interviewer transcribed the interviews they conducted.

Interviews centered on a series of nine questions (shown in Appendix A). To ensure sufficient responses from a limited pool of faculty matching the inclusion criteria, the questions were not validated. Instead, to ensure they clearly communicated the desired query, they were assessed by a tenured faculty member specializing in academic writing.

Based on the research focus identified in the interviews, faculty researchers were categorized into the disciplinary fields of Sciences, Humanities, or Social Sciences. This broad categorization was used to retain anonymity for faculty researchers in disciplines with low numbers of respondents. Interviews were recorded and each audio file was assigned a unique code resulting in 21 participants from the Humanities, 38 from the Sciences and 20 from the Social Sciences. Each interview was transcribed manually by the interviewer. All data were anonymized. Discipline specific information was retained only when it did not identify the participant.

Coding

To code semi-structured in-depth interview data, Campbell, Quincy, Osserman & Pedersen (2013) recommend a three stage process consisting of a coding schema with a high level of intercoder reliability developed using a sample of transcripts, agreement between coders on the schema and final coding of the entire set of interview data. All three stages were followed for this research. For stage one, a sample of five transcripts was coded independently by each author. An intercoder reliability statistic was not calculated. The codes were then discussed for this sample and stage two involved negotiating the coding schema for the rest of the transcripts. The remaining transcripts were coded together by the authors. Each question was assigned a color and each transcript was color coded accordingly for ease of categorization. When there was overlap of concepts across questions, key themes were identified and more granular coding was applied. Table 1 lists the coded concepts and their associated interview questions. For some responses coding overlapped—the content mapped to more than one concept. When the response was ambiguous, it was interpreted relative to the question. Questions were designed to be open-ended to allow faculty to offer a more nuanced response and to help alleviate any discomfort around metrics as a topic.

Overall patterns of responses were also assessed by both authors working together. Responses, across one subject designation, were reviewed by concept or question, depending on the fit. For example, Question 3 responses across all Humanities faculty were read and a summary was compiled. This process was repeated for each concept or question and within each subject designation.

Table 1

*Correlation between the concepts identified in responses with the questions asked of the faculty researchers**

Concepts	Questions
Personal Knowledge/ Personal Opinion	Question 3: What do you think when you hear the terms impact metrics?
Personal Examples	Question 4: What is, or has been, your own experience with impact metrics?
Publishing Venue	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Editorial Responsibility (encompasses peer reviewing, Editorial Board and Editor)	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Discipline Specific Application	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Individual PTR**	Question 5: How have impact metrics influenced your publishing/productivity/research program?

Administrative PTR**	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Grant Application	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Individual Tenure	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Administrative Tenure	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Hiring	Question 5: How have impact metrics influenced your publishing/productivity/research program?
Keeping Current	Question 6: How do you keep current with impact metrics? Why do you use this method?
Graduate Students	Question 7: How do you advise your graduate students on the use and range of impact metrics?
Altmetrics	Question 8: Non-traditional metrics, e.g. counts of tweets and blog references, are commonly known as altmetrics. Have you considered/do you use any alternative metrics?
Learning More/Learning About	Question 9: What on campus resource would you turn to for assistance of information about impact metrics? Research Office, Librarian, departmental colleague, other?
*Questions 1 and 2 were not included as they were demographic in nature. Question 1: What is your area of research? With which department(s) are you affiliated and Question 2: How many years are you post-tenure or promotion?	
** PTR is the acronym used for Progress through the Ranks	

Findings

Research Areas and Departmental Affiliations

All UTM departments were represented except for the Department of Visual Studies (see Figure 1a for departmental response rates). Response rates were calculated using only faculty researchers who matched the inclusion criteria of the study. The highest response rates were from faculty researchers in Biology, Psychology, Chemical and Physical Sciences and Language Studies (92%, 91%, 88% and 88%). The lowest response rates were from English and Drama, Sociology and Historical Studies (36%, 40% and 43%). The remaining departments fell in the middle, and response rates ranged from 50% to 75%. To retain anonymity for faculty researchers in disciplines with low numbers of respondents, the broader categorization of Humanities, Social Sciences, and Sciences were used for the remainder of the findings. The categories were assigned based on the research focus identified by the faculty researchers in their interviews. Within these designations, 81% of the Sciences faculty, 61% of the Social Sciences faculty and 53% of the Humanities faculty responded (shown in Figure 1b).

Figure 1a. Percentage response rate for interviews by department.

Figure 1b. Percentage response rate for interviews by disciplinary category.

Years Post-tenure

One of the inclusion criteria for the study was that the faculty researchers must be at least five years post-tenure during the year in which the interviews were conducted. Given the time period in which these faculty researchers have been engaged with their research, impact metrics of all types have evolved from simple beginnings to the complexity that is apparent today (Van Noorden, 2010).

Interview Responses

Responses from faculty researchers were coded using the concepts shown in Table 1. These concepts were then clustered into four functional higher level categories—Knowledge, Use, Learning, and Mentoring (Table 2). The description that follows is organized according to these categories.

Table 2

Higher level categories used to code the faculty researcher interview responses

<i>Knowledge</i>	<i>Use</i>	<i>Learning</i>	<i>Mentoring</i>
Personal Knowledge/ Personal Opinion Altmetrics	Personal Experience with impact metrics Influence of impact metrics on publishing/productivity/research program	Learning More/ Learning About Keeping Current	Graduate Students

I. Knowledge

Personal knowledge/personal opinion

Eighteen of the faculty researchers interviewed from the Humanities were aware of the concept of impact metrics although not all of them saw it as applicable to their disciplines. There was a strong sense that impact metrics are driven by the Sciences and that they are more applicable to subjects that fall within that category.

I know that the research impact metrics is already very widely used especially in Sciences. It's coming to Humanities as well. And I can see both difficulties and good aspects in that as well.—Humanist

...It's obviously something that is tricky for Humanists because citation has never been a way that we've measured success in fact as Humanists often point out, our understanding of impact metrics is not only citation, but because when I hear impact metrics the first thing I think of citation rates. I always think of the immediate Humanists objection is that the people who most likely to get cited in a piece of Humanist publishing are the people that person disagrees with and thinks are wrong...So we just haven't operated in the same mode as Science because citation is not the way we measure success. But as I say I am aware that impact metrics can measure other kinds of things because I work on various digital projects, digitally Humanist contexts...—Humanist

The knowledge of this topic that came from 17 of the 20 Social Science faculty researchers was very mixed and was more contextualized on an individual basis. It was expressed with a range of nuanced responses, including some anxiety and distrust of metrics.

Means nothing to me – zero. I have had zero (experience). I don't even know what it means so I wouldn't know if I had experience or not.—Social Scientist

It also immediately generates in me a bit of anxiety because it's not to me ... although I recognize the need for some shortcuts and heuristics and these sorts of things, it also strikes me as inherently problematic and inherently controversial and there is no way to avoid that so ... why does it make me worried? It makes me worried because it tends to be ... tends to end up being and probably out of necessity inflexible.—Social Scientist

Only one respondent from the Sciences indicated no knowledge of the term impact metrics. The remaining 37 faculty researchers from the Sciences displayed a high level of confidence in impact metrics, but were not always able to accurately define what impact metrics meant. In contrast to the Humanists and Social Scientists there were some very negative views expressed by members of this group. Overall, the knowledge base was not as broad or robust as is typically assumed of faculty researchers in the Sciences.

It is not the be all and the end of all but many of us would not be completely honest if we said we are not interested in it. In other words, it is not my net worth as a researcher or as a human being but it is one measure that is important amongst other things.—Scientist

Impact metrics are basically a convenient way to not actually look at the work itself as far as I am concerned.—Scientist

Altmetrics

Eighteen of the faculty researchers from the Humanities indicated that they were not using alternative metrics (altmetrics) while three did not answer the question in a clear manner.

I haven't considered them. I'm not adverse to them. ... My goal is to reach interested community and so because I'm a social media user I don't mind the idea of altmetrics as a way of measuring social media presence. I think it is a thing academics can do.—Humanist

As an editor of multiple journals ... I'm very interested in issues of downloading ... and indeed of alternative approaches to publishing and alternative avenues to peer reviewed and scholarly publishing. So those are all things I'm alert to and I engage with over time but nobody I'm working with is using the term metrics or altmetrics.—Humanist

Of the 20 faculty researchers interviewed in the Social Sciences, 16 responded that they had not heard of, or were not using, alternative metrics, but two expressed interest in using altmetrics going forward. Three people indicated they had heard of altmetrics but were not using them and one person did not answer the question in a clear manner.

So I don't use them but it's interesting some of the work I do is work that I am interested in its impact beyond academia.—Social Scientist

I'm not surprised about them. I think that it would take a really long time to get that into the academic psyche though. Because the problem is, we're so blindly following citation index as if it is really instructive and useful and I question that and there is literature that questions that as well.—Social Scientist

Thirty-four Science faculty researchers answered that they were not aware of or were not using alternative metrics with one of these researchers being interested in using them in the future. One person was aware of altmetrics, but was not using them. Three people did not answer the question in a clear manner.

No. Absolutely not, because to me the most objective and scientifically valid way to measure my impact is through the number of citations a paper received. Just looking at our paper, talking about our paper, does not cut it.—Scientist

I've never tried to use them. And I think it is probably like many other things in technology that a day will come when I have no choice. But until that time I have other things to do.—Scientist

II. Use

Personal experience with impact metrics

Fourteen of the 21 Humanities faculty researchers stated that they did not use impact metrics. Seven indicated both an awareness of and some experience with impact metrics, e.g. on editorial boards, in administrative roles and as they relate to grant funding, evaluating dossiers and applications. There was disagreement on whether grant-funding agencies valued impact metrics, with some faculty researchers believing they were not valued by funding agencies, while others suggesting they were essential for success.

I personally have some concerns because the impact metrics, from what I have understood can have a way of reinscribing a traditional disciplinary framework and because I am such an interdisciplinary scholar, it can be problematic but as I said, I really don't know much about this so maybe I am wrong.—Humanist

I keep a pretty close watch. I suppose I have monitored them fairly closely ever since Web of Science went online. ... I have a spreadsheet of my citations year by year and now it's easier because of Google Scholar.—Humanist

Those that indicated that they did use impact metrics felt that metrics work in Science and Philosophy, but not in other Humanities disciplines. Explanation for why they did not work varied and included references to the multidisciplinary nature of the research and the fact that books are more highly valued than articles. One faculty researcher

indicated that their department had investigated the use of impact metrics, but the department felt that impact metrics did not map well to their discipline.

A key point raised by Humanists was the recognition that impact was valued, but metrics were not. Faculty researchers connected impact with the disciplinary knowledge of which journals were highly valued or had low acceptance rates and which authors were key in their field of research. One faculty member indicated that they personally used crude measures of impact, such as a journal's target audience, page rates, page hits, and returning visitors. But for most respondents, journal level metrics were mentioned most often as being the primary indicators of value.

Conferences were identified as another valued measure of impact, raised by two of the Humanists interviewed. The conferences that invited faculty researchers to present their research, the manner in which speakers were introduced, and the nature of feedback received from participants on their publications were all viewed as a measure of impact.

Five of the faculty researchers interviewed from the Social Sciences were not using impact metrics or had not been exposed to them. Regardless, awareness of metrics was higher among the Social Scientists than among the Humanists. Faculty researchers in the Social Sciences clearly stated that the reputation of authors and the quality of work being published within a journal were a more important focus than a journal's impact factor. Several research fields have well-established ranked lists of journals. One faculty researcher mentioned that despite the fact that they often had lower impact factors, niche journals played an important role in their research field.

I would say about my experience is that there are all of these kinds of measures you have to take with a grain of salt. Because at least in the Social Sciences it is not as much of a cumulative field perhaps as the Natural Sciences, although I am not a Natural Scientist so I don't know.—Social Scientist

Other measures of impact that were mentioned by faculty researchers in the Social Sciences included how many people access a paper, how many times a paper is downloaded, rejection rates, publishing monographs rather than journal articles (and the need to justify this), most viewed, citation indices, and citation counts. As well, several tools and services were mentioned including ResearchGate, TSpace (the University of Toronto's institutional repository), Google Scholar, and Social Science Citation Index. Exposure to metrics was described as coming through responsibilities and activities other than research, for example, promotions committees, journal boards, grant applications and membership in external review committees.

Concerns and issues with impact metrics that were raised by the Social Scientists included the possibility of skewing an international reputation with a small number of key papers. Concern was also expressed regarding Google Scholar capturing wider impact than the Social Science Citation Index but inflating impact as it captures more formats and/or outlets for publications, such as books and conference papers. Respondents

from the Social Sciences recognized that newer journals require time to show their impact.

Surprisingly, the greatest diversity of responses came from the Sciences. Comments ranged from “I don’t check metrics” to “I check regularly.”

I do what I am interested in. That is the great joy of being a professor. I do what I want and if you don't like it, too bad.—Scientist

You can't read everything. I focus on reading papers that are cited a lot, so all of these metrics are very helpful.—Scientist

Faculty researchers in the Sciences mentioned different approaches to choosing where to publish. Some of the comments referred to the journal's audience/readership, the importance of selection to career progression and the recognition that the quality of journal and rate of publication are more important than the journal's impact factor.

I don't try for the highest impact journal and then go for the next, next. I go for the journal that I believe everyone who is doing research in my area will be reading.—Scientist

When you are in the earlier stage of your career it is important to publish in high impact journals because that is basically what sells you to the jobs. It is a double-edged sword because sometimes when you publish in such high impact journals as Nature and Science you have to sell a story and you don't have the space to really explain the pros and cons and the different alternative explanations or interpretations.—Scientist

Influence of impact metrics on publishing/productivity/research program

Six of the 21 Humanities faculty researchers felt that impact metrics did influence them in some way. All of these were in relation to their choice of publishing venue and/or for hiring new faculty at the University. The remaining 15 respondents felt that impact metrics had no effect on them, but 10 of these had some further knowledge around the use of impact metrics as they pertain to publishing venue, editorial board activity, progress through the ranks (PTR), promotion and tenure (both their own and in an administrative capacity), grant applications (both as an applicant and as a reviewer), and for hiring purposes.

Definitely because I'm on hiring committees all the time and on tenure committees the potential for future research is an official criteria.—Humanist

I haven't been explicitly driven by metrics I haven't published something with the thought 'now this will boost my citation index count' but I wouldn't be surprised if it does play some role in the work that I do. Maybe it has some subterranean influence.—Humanist

... I would say that I am certainly conscious of the impact factor of various venues. And I try to make sure to a reasonable extent that I maximize the impact in terms of where something appears.—Humanist

Five of the 20 Social Scientists felt that metrics did impact on them in some way. The impact was related to their choice of publishing venue, with influence also extending into PTR, tenure and promotion (both personal and administrative), and grant applications (both as an applicant and a reviewer). Fifteen respondents felt that metrics had no impact on them, but 12 of these had some knowledge around the use of impact metrics, which included publishing venue, editorial board activity, PTR, promotion and tenure (both their own and in an administrative capacity), and grant applications (both as an applicant and as a reviewer).

Certainly not my research program. Certainly not my productivity. But it might, I could envision that I would look at that when I send a journal out for publication. To be honest though I haven't looked at it. I've sent 2 papers out in the last year and I have not looked at that when I sent that out I just thought about would the theme match any, should I try it? Is it good? I didn't go the extra step and check I just thought ah ... it has a good reputation I'll send it.—Social Scientist

Yes, if specifically you are talking about impact factors. It's partly because they're not talked about and partly because they are not really a reliable indicator because they are calculated on a rather short timescale and in our fields it takes a long time for a paper to get published.—Social Scientist

Seventeen of the 38 Science faculty researchers felt that impact metrics had no effect on them, but only one of these had no knowledge around the use of impact metrics. Of the 16 with some knowledge, the primary area of awareness was in choosing a publishing venue. There was also awareness in the areas of PTR, promotion and tenure (administrative), editorial board activity, grant applications (both as an applicant and as a reviewer) and hiring. Twenty-one respondents felt that impact metrics did influence them in some way, with publishing venue being the most influential. Two areas that received fewer responses, but were still often mentioned, were grant applications (as an applicant) and PTR, promotion and tenure (administrative). The remaining areas (mentioned by four or fewer respondents) were hiring, editorial board activities, and PTR, promotion and tenure (personal). One Scientist specifically focused on number of publications as the metric they used and/or found influential.

I think the only way it would influence it is in applying for grants in that I put them down to try and impress upon the committee how good I am but it doesn't influence how or what research I do.—Scientist

Just because I ignore them doesn't mean that other people ignore them so certainly when we apply for CIHR, when we apply for NSERC, half of our grants where we are supposed to put on our CV and if we don't someone looks them up

anyway what the impact or citation factor is of the journals that we published in. That's probably the biggest actually is the impact factor.—Scientist

But I'm looking more at where are the papers that are of interest to me written by the people who are of interesting authors being published. And hey if that guy is publishing a lot in this journal now maybe we should publish there. So it is more like a fan club concept than counting.—Scientist

III. Learning

Learning more/learning about

The authors acknowledge that this question had an inherent bias as the authors represent one of the resources available on campus. Table 3 illustrates in more detail the range of responses received to the question of “What on campus resource would you turn to for assistance about impact metrics?”

The top choice in the Humanities was the library, followed by a preference for self-reliance.

And I would trust them too because the librarians wouldn't necessarily have a vested interest one way or the other where some of my colleagues might. And they might share my bias or they might have another bias about the metrics and so talking to a librarian I think might be a little more fruitful because it is not necessarily close to their career hearts.—Humanist

In the Social Sciences, colleagues and the library were equally chosen as the primary campus resource for support, but their own ability to locate the information was another strong choice.

I have no idea where I would go. I wouldn't necessary think of going to the library because I wouldn't necessarily think of it as a source of expertise on this although I could be wrong. I wouldn't think of the Research Office ... I would maybe go to 1 or 2 colleagues ... —Social Scientist

Science faculty had a strong preference for the library as a campus resource. Asking colleagues and looking for the information on their own were the next most common responses.

Well now I know I would go to you. Now I know you are an expert.—Scientist

Table 3.

The percentage of faculty within each disciplinary category identifying who they would ask for assistance in learning more about impact metrics and altmetrics.

	Sciences (n=38)	Humanities (n= 21)	Social Sciences (n= 20)
Library	45%	29%	26%
Self	20%	26%	19%
Colleague	20%	3%	26%
Research Office	6%	10%	4%
Graduate Student	3%	3%	0%
Not answered	2%	16 %	19%
Admin Staff	2%	0%	4%
Journal Editor	2%	0%	0%
Chair	0%	6 %	0%
Don't know	0%	3%	4%
Other academic department	0%	3%	0%

Keeping current

Of the 21 faculty members in the Humanities who were interviewed, 14 did not keep current with impact metrics. Two of these respondents explained that they did not keep current because either metrics were not applicable in their field or no method existed within their discipline for measuring impact. One faculty member indicated that they will look things up when they need to for grant review panels. Two of the 21 faculty members actively keep current through research networks, major journals, Google Scholar and Web of Science. While Scopus was mentioned, it was unclear if faculty researchers were using it for this purpose. The remaining five faculty researchers did not clearly indicate whether or not they were keeping current on impact metrics.

So there is no mechanism within my field and therefore I don't.—Humanist

Fifteen of the 20 Social Sciences faculty did not keep current. Three of these 15 indicated that they look things up when they need to, for example, for recruiting or to get a quick read on someone, for tenure, promotion or hiring committees, for unfamiliar journals or for journal comparisons. One person expressly indicated that they do not keep current because they are not interested in metrics. Five of the 20 faculty in this category do keep current through their colleagues, Google Scholar and the Social Science Citation Index.

No, cuz I'm not terribly interested in and therefore I'm not terribly current.—Social Scientist

Yeah, I go on the Social Science Index... I usually go on it when I'm looking to advise a graduate student or to publishing something myself.—Social Scientist

I check Google Scholar. Because it captures everything or most things.—Social Scientist

Eighteen of the 38 Science faculty do not keep current on impact metrics. Reasons cited included a lack of need and a concern for the most appropriate or effective outlet to reach their readers. A few of these faculty indicated that although they do not regularly keep current with metrics, they do on occasion look up individual metrics when the publication has relevance for a graduate student. Others will consult metrics when they need to know a traditional impact metric, when they are evaluating others or need to understand how others were evaluated. Sixteen of the Science faculty maintain current awareness of impact metrics for assessing tenure dossiers and other reviews. The methodologies used to keep current vary with Web of Science, Google Scholar and word of mouth/colleagues mentioned most frequently. Four respondents did not clearly indicate in their responses if they keep current on impact metrics.

I don't pay attention to them. Why? Because it has worked for me for a long, long time.—Scientist

Google. I use Google for everything. I know how Google works and I like it!—Scientist

I actually will not, I am not good at following, I am not good at devoting computer time to things that are not critical to what I do.—Scientist

IV. Graduate Students

None of the respondents in the Humanities explicitly stated that they advise their graduate students about impact metrics. However, 13 noted that they advise their graduate students about some aspect of publishing with eight of these focusing on where to publish. Topics covered included the need to publish and the ranking of journals. One Humanist talked about digital scholarly objects as publications, the uniqueness of the considerations, and the potential for the use of metrics in these categories. One faculty researcher stated that they did not advise their graduate students in this area and seven did not clearly answer the question.

I talk to them more about how to write and where to publish. I don't talk to them so much about metrics. Part of the reason is I don't think it is very useful at that stage in your career because they have zero publications or few or just a very few or just recently published. But maybe they could be a bit more savvy by knowing about things like impact factor and stuff like that.—Humanist

While 11 faculty researchers in the Social Sciences mentioned that they do advise their graduate students, only one explicitly focused on metrics. Most of the graduate student

advising was focused on where to publish with four faculty mentioning journal ranking. Six faculty do not advise their graduate students and three did not clearly answer the question.

Partly on impact factor and partly on common knowledge. I mean it is based on reputational standing in the field, which sometimes may or may not correspond to the published impact factors. I don't go out and systematically review the impact factors and then update my graduate students on a yearly basis or a half-yearly basis.—Social Scientist

Thirty-one Science faculty researchers advise their graduate students about impact metrics with 23 of these respondents focusing on where to publish, including mentioning metrics and ranking of journals. Four of the 31 advise their graduate students on the need to publish, while two focused expressly on metrics as a concept beyond its relationship to journal ranking. Four faculty members in the Sciences do not advise their graduate students about impact metrics and three did not clearly answer the question.

Well I emphasize the fact that most administrators use it as a metric to evaluate potential candidates so we should try and publish in the highest impact journals because that is something that granting agencies and hiring committees will look at.—Scientist

No, they teach me. They know more about it then I do so they are the ones who typically say maybe not this, maybe that. I used to know about this but I am not actively trying to keep up.—Scientist

I don't advise them. If they are interested in that, I think they just learn it however one learns it.—Scientist

Discussion

Interviews revealed a significant gap in consensus between the authors' 'librarian view' of metrics and the faculty researchers' understanding. It is the authors' view that the professional eye of librarians on data sources sometimes leads to a more informed approach to their use than that described by some of the faculty researchers interviewed. This dichotomy in approach is further highlighted by faculty disciplinary differences. There appears to be a need to fill the gap between librarians and faculty researchers with examples of disciplinary best practices in the use of impact metrics.

The 65% participation rate for this research was remarkably high. The authors are still debating the reason for this—should it be attributed to a growing interest in metrics information or to the use of a collegial humorous request for faculty researcher input supplemented by the offer of a free beverage? Regardless of causation, the collegial approach established an interview environment that was conducive to the discussion of a complex, highly charged topic.

I. Knowledge

Personal knowledge/personal opinion

A recent survey by DeSanto & Nichols (2017) probed faculty to determine their knowledge, use, and opinions about impact metrics. While there are a few fundamental differences (they used a survey instrument, they surveyed all tenure-track faculty and the composition of disciplines that responded to their survey was not identical to this study), there are still a few questions that are similar enough to warrant comparison. DeSanto & Nichols found that the faculty members from the Humanities and Arts had considerable lower rates of understanding than those in the Sciences and Social Sciences, Business and Social Services, but that faculty in the Sciences and Social Sciences had similar understanding of metrics. In contrast, the current study found that a much higher percentage of Humanities faculty were aware of the concept of impact metrics (86%), a slightly lower percentage from the Social Sciences had some knowledge of this concept (85%) and only one respondent from the Sciences indicated they had no knowledge, i.e. 97% had some knowledge/awareness. For comparison, it should be noted that the question in the DeSanto & Nichols survey asked faculty how well they felt they understood scholarly metrics, whereas the interview question used in this study was "What do you think when you hear the terms impact metrics?" As awareness does not necessarily equal understanding, this difference may account for some of the discrepancy in the patterns of responses.

Altmetrics

The interview data from the current study indicated very little knowledge or awareness of altmetrics in the three disciplinary areas. No one in the Humanities indicated any knowledge or use of altmetrics. Eighty percent of the respondents in the Social Sciences indicated that they were not aware/using them but 1.5% had heard for them, but were not using them. Eighty-nine percent of the Scientists indicated they were not aware/using them and only one person indicated they had heard of them, but were not using them. As this area has generated more discussion and exposure across all the disciplines in the time since the interviews were conducted in 2012 and 2013 (e.g., Thelwall et al. 2013; Dinsmore, Allen & Dolby, 2014 and Htoo and Na, 2017), it is postulated by the authors that this area is one where the responses might be substantially different were the interviews repeated.

II. Use

Personal experience and influence of impact metrics

Sixty-seven percent of the faculty interviewed from the Humanities stated that they did not use impact metrics as compared to 25% from the Social Sciences. The range of opinions and value attributed to impact metrics varied the most within the Sciences. Forty-five percent of the Science faculty interviewed stated a belief that metrics had no effect on them. The types of uses differed between the three disciplinary categories, but

included editorial boards, administration, grant funding, evaluating dossiers for promotion, job applications, and choosing where to publish. When asked more specifically about the areas influenced by impact metrics, 29% of the Humanists felt that impact metrics influenced them in their choice of publishing venue and/or when hiring new faculty at the University. Twenty-five percent of the Social Scientists interviewed were impacted in their choice of publishing venue, but also in their progress through the ranks, tenure and promotion (both personal and administrative), and grant applications (both as an applicant and a reviewer). Fifty-five percent of the Scientists pinpointed choosing a publishing venue as the decision-making process most affected by impact metrics.

The increasingly complex area of impact metrics offers an excellent opportunity for librarians to demonstrate their value to both faculty researchers and the university. Roemer & Borchardt (2015) highlight the potential for librarians to encourage faculty and administrators to think more critically about the types of metrics that are used, but caution librarians to remember that different disciplines may have different norms and outputs for their research. Building up the librarian portfolio and enhancing the services offered to support faculty and administrators through promotion and tenure, as well for grant applications, is area of growth potential for library services and supports.

III. Learning

Learning more/learning about

Table 3 illustrates in more detail the range of responses received to the question of “What on campus resource would you turn to for assistance about impact metrics?” DeSanto & Nichols (2017) asked a very similar question in their survey, “Where on campus would you turn for help with scholarly metrics?” but they did not differentiate the responses by disciplinary category. Their faculty chose the library as the predominant location on campus to go for help with metrics, which is consistent with the findings in this study for all disciplinary categories. The second most common choice of the faculty surveyed in DeSanto & Nichols was “Colleagues in Department or Chair.” In the current study, colleagues and departmental Chairs were two separate responses, of which only the Humanists indicated they would go to their Chair for assistance. Colleagues was the second highest choice for the faculty researchers in both the Social Sciences and the Sciences, but not for the Humanities whose second choice (26%) was to learn on their own. Only a small percentage of Humanists would go to colleagues for help with scholarly metrics (3%).

Keeping current

Keeping current with impact metrics was not a priority for the majority of the faculty interviewed in the Humanities (67% did not keep current) and Social Sciences (75% did not keep current). There appears to be some need to keep current on impact metrics in the Sciences, as 42% maintain current awareness for assessing tenure dossiers and other reviews.

With the continuing addition of new metrics, new applications, and aggressive product marketing, time constraints on both faculty researchers and librarians makes current awareness increasingly challenging. There is a significant need for focusing library resources in this area, which is associated with growing researcher and institutional competition for funding and prestige.

IV. Graduate Students

Many graduate students will continue on to become the next generation of faculty researchers. It is worth noting that the faculty perception of whether or not they advise their graduate students about impact metrics was quite pronounced between the Sciences and the other two disciplinary categories. None of the respondents in the Humanities explicitly stated that they advise their graduate students about impact metrics and only one faculty researcher in the Social Sciences indicated that they did. It should be noted though that 62% of Humanities faculty and 55% of Social Sciences faculty indicated that they advise their graduate students on publishing, including the need to publish and the ranking of journals, while 82% of the Science faculty interviewed advise their graduate students about impact metrics. The areas of focus are very similar to the other categories and include where to publish, metrics, ranking of journals, and the need to publish. Only two faculty researchers from the Sciences expressly advise their graduate students on metrics as a concept beyond their relationship to journal ranking.

The lack of congruence in teaching graduate students about impact metrics raises two important questions to delve into further: first, how are graduate students currently acquiring knowledge of metrics? And second, is this knowledge sufficient for meaningful application? With tight limitations on researchers' time, engaging librarians in teaching a critical awareness of impact metrics to graduate students may offer future benefits as the many of today's graduate students will be the faculty members of the future.

Study Limitations

The first limitation of this research is that it is a case study of one segment of a population of a university campus. The faculty researchers that agreed to be interviewed and the University of Toronto Mississauga campus may have inherent characteristics that are not replicated in faculty researchers at other institutions. These characteristics would include, but are not limited to, the tri-campus design with its associated cross-appointments of faculty and the different composition of students and research foci.

The time lag from data collection to the publication of this article is the second limitation to be acknowledged. This research was originally conducted in 2012-2013, which is four years from the date of publication. Although the metrics environment has changed considerably in this time, the authors believe the research findings are still valuable as they represent patterns of knowledge over a period of time. Braun (2017) cautions

against the dangers of misusing impact metrics and the potential role for librarians in filling the gap.

Conclusions

This research was conducted to examine the perspectives of senior research faculty in their use of impact metrics and, in so doing, provide evidence to inform the alignment of library services in an area of support related to faculty prestige and increasing competition for research funding. Seventy-nine research faculty from a broad range of disciplines, with five or more years post-tenure, were interviewed. Responses were varied and tied closely to disciplinary fields.

This research reveals a need to fill a knowledge and information gap between librarians and faculty researchers with robust examples of disciplinary best practices of metrics use, as well as the most recent product information as pertains to impact metrics. Also, it demonstrates a need for librarian engagement in providing current and comprehensive metrics information to graduate students as well as faculty.

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Appendix A

Interview Questions

1. What is your area of research? With which department(s) are you affiliated
2. How many years are you post-tenure or promotion?
3. What do you think when you hear the terms impact metrics?
4. What is, or has been, your own experience with impact metrics?
5. How have impact metrics influenced your publishing/productivity/research program?
6. How do you keep current with impact metrics? Why do you use this method?
7. How do you advise your graduate students on the use and range of impact metrics?
8. Non-traditional metrics, e.g. counts of tweets and blog references, are commonly known as altmetrics. Have you considered/do you use any alternative metrics?
9. What on campus resource would you turn to for assistance of information about impact metrics? Research Office, Librarian, departmental colleague, other?