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Sarah W. Sutton
Emporia State University

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New knowledge is built on existing knowledge and academic libraries are the primary repositories of existing knowledge for the scholars whose work they support. In these times of belt tightening and budget reductions, it behooves academic libraries to think about how to demonstrate to administrators the value being returned on investments in the library, and to provide scholars with tools to do the same. Traditional means of measuring the quality of new knowledge like the impact factor and h-index are being made richer and more meaningful through the addition of new, social media based alternative metrics. Altmetrics also provide scholars communicating in non-traditional venues like the blogosphere and the Twitterverse with meaningful measures of the impact of their work. In this presentation I will introduce altmetrics, discuss their advantages and disadvantages relative to more traditional metrics, and propose some specific uses to which academic libraries may put altmetrics in support of the transitions now occurring in scholarly communication and thus in academic libraries

Keywords

altmetrics, social media, scholarly communication

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Altmetrics: What Good are They to Academic Libraries?

SARAH W. SUTTON
Emporia State University
Emporia, KS
Ssutton3@emporia.edu

Abstract

New knowledge is built on existing knowledge and academic libraries are the primary repositories of existing knowledge for the scholars whose work they support. In these times of belt tightening and budget reductions, it behooves academic libraries to think about how to demonstrate to administrators the value being returned on investments in the library, and to provide scholars with tools to do the same. Traditional means of measuring the quality of new knowledge like the impact factor and h-index are being made richer and more meaningful through the addition of new, social media based alternative metrics. Altmetrics also provide scholars communicating in non-traditional venues like the blogosphere and the Twitterverse with meaningful measures of the impact of their work. In this presentation I will introduce altmetrics, discuss their advantages and disadvantages relative to more traditional metrics, and propose some specific uses to which academic libraries may put altmetrics in support of the transitions now occurring in scholarly communication and thus in academic libraries.

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Altmetrics: What Good are they to Academic Libraries?

The venues in which the outputs of scholarly and creative activities are published have changed. Instead of being restricted to publishing written reports in printed or even digitally produced journals, scholars are sharing the results of their research on the Web by blogging, tweeting, posting, responding, linking, bookmarking, sharing, linking, etc. Similarly, the content they are sharing is changing. Often, in addition to, but sometimes instead of, written reports and conference presentations, scholars are publishing data sets, videos, source code, and much more.

One thing that has not changed is the desire to understand and measure the impact of scholarship. Decisions from return on investment to promotion and tenure are supported by such measurements. One such measurement of impact is citations. Traditional scholarly journals are evaluated based on the number of citations to the articles published in them using a metric called Journal Impact Factor (JIF). Journal impact factor is a measure of the average number of citations to articles published in a journal over a two or five year span. "Citable items" are usually articles, reviews, proceedings, or notes rather than editorials or letters to the editor.

However, the JIF can be applied to journals but not to individual articles. Equally important is that while the JIF is a comparative measure, comparisons should only be made between journals within a single field of study (Thomson Reuters, 2014). It is also important to note that the JIF is a proprietary measurement which is available by subscription only from Thomson Reuters' *Journal Citation Reports*.

The measure of an individual scholar's achievement was traditionally based on a ratio of the number of articles published to the number of citations. This ratio is called the *b*-index. The *b*-index is a measure of the impact or productivity of an individual author or group of authors. It is based on the number of citations received by that author's most cited papers. Unlike the JIF, *H*-index measures are available from a variety of sources. These include Google's *i10*-index (Connor, 2011) or Harzing's (2014) Publish or Perish tool which collects and analyzes cites from Google Scholar and Microsoft Academic Search, using them to calculate an author metric. Like the JIF, *b*-index metrics are criticized for being easily manipulated, for varying depending on the scope of the knowledge base from which citations are drawn, and for providing meaningful comparisons only within a particular field of study.

The challenge that these traditional measures of scholarly output present is that "long established citation-based metrics [are] unable to capture the increasing variety of online references to a scholar's work" (Piwowar, 2013, p. 8). New scholarly outputs and communication channels require new tools for measuring the influence of these outputs. Alternative metrics or altmetrics is the name recently given to collections of these new tools. The aim of this paper is to introduce altmetrics, to identify some of the advantages and disadvantages of their use, and to suggest ways in which their use might enrich the work of and services in academic libraries.

What are Altmetrics?

In comparison to traditional metrics used to measure scholarly output, altmetrics include a much broader spectrum of measurements (citation counts, web based references, article views/downloads, social media mentions, news media mentions, etc.) of a much broader collection of scholarly authors and outputs (articles, people, journals, books, data sets, presentations, videos, source code repositories, etc.). Altmetrics tend to measure article-level (or other individual chunks of output)

usage, thus they offer a more granular way of measuring many aspects of scholarly output than do journal level measurement tools like the Journal Impact Factor.

Altmetrics became possible as a result of some technological advances that make the communications they measure possible. Sources of altmetrics display the same variety as the scholarly outputs that they measure and the ways in which those outputs are communicated. It is becoming common place for publishers and aggregators of scholarly articles and other content to provide altmetrics along with that content. BioMed Central, PLoS, Frontiers, Nature Publishing Group, and Elsevier are some examples.

Many publishers rely on altmetrics aggregators (who are distinct from aggregators of content like articles) to provide them with article level usage data. However some, for example PLoS, collect their own article metrics rather than purchasing them from an aggregator. Not all aggregators use the same data points or sources for metric calculation. This allows them to complement one another when used simultaneously but also has the potential for creating inconsistencies.

For example, PLoS, ImpactStory, Altmeter, and PlumAnalytics collect article-level metrics for some of the same data sources. But are the numbers they present to users consistent for the same paper or are they different due to different collection dates, data sources, or methods of collection? Each of the aggregate article-level metrics providers may collect and present article-level metrics as relevant for their target audience. Thus, as article-level metrics consumers and researchers, we need to have a clear understanding of the potential pitfalls when using article-level metrics data." (Chamberlain, 2013, p. 7)

Some altmetrics aggregators make their measurements freely available to anyone with an Internet connection while others provide them for a fee or subscription. Altmeter.com is an example of both. They make a single metric (which is really an aggregation of multiple measurements from multiple sources) available via a free, downloadable "bookmarklet" (for non-commercial use) which, when selected while reading a paper online, provides an instant snapshot of the article's altmetrics data calculated by Altmeter.com's algorithm ("Altmeter," 2014). Their fee-based product, Altmeter Explorer, "lets you monitor, search and measure conversations about" publications and obtain "insights, track mentions and measure levels of attention over time" ("Altmeter," 2014).

Advantages and Disadvantages

Like any new tool, there are advantages and disadvantages to using altmetrics over traditional metrics for measuring the quantity, quality, and impact of scholarly output. Advantages include the ability to discern new things about impact, being based on open data, speed, and diversity of sources. Disadvantages on the other hand include lack of control created by too many variations, susceptibility to manipulation, and the need for standards.

Advantages

Altmetrics rely on more than just citations; altmetrics include discussion by the media, mentions in the news, discussion by the public as well as importance to colleagues. Most of the advantages of altmetrics over traditional measures of scholarly output stem from the diversity of sources used in altmetrics calculations, in no little part because multiple sources of data allow triangulation. The strength that triangulation adds to altmetrics mirrors the strength that triangulation adds to any other research results: corroboration from multiple, independent sources. This same variety offers "the possibility to discover new insights into impact that have been previously impossible to obtain" (Galligan & Dias-Correia, 2013, p. 56).

Another advantage that altmetrics have is that they are often based on open data. The difference between altmetrics and traditional metrics is that altmetrics "use mostly publically available data, making the process and calculations completely transparent" (Galligan & Dyas-Correia, 2013, p. 57) where as traditional metrics like the journal impact factor are often made available only by subscription and calculated using a less transparent algorithm (even though the equation has been published many times).

Altmetrics also have the advantage of speed; they are nearly real-time metrics of scholarly impact. According to one study, 15% of Twitter citations occurred on the same day an article was published, 39% in the same week, and 56% in the same month (Priem & Costello, 2010). In contrast, the *h*-index, by definition, is calculable only at the end of the year for which it is being calculated, sometimes later depending on publication schedules.

Disadvantages

The great advantage of altmetrics, diversity, can also be considered a disadvantage. Because of the wide variety of sources for altmetrics data and because they lack the standardization of definition that is provided by initiatives like Project Counter, it is easy to misinterpret altmetrics' meaning or take them out of context. "There is no one-stop shop for everything because altmetrics are only beginning to be developed on a larger scales [and] to be accepted on a larger scale (Galligan & Dyas-Correia, 2013, p. 56).

In a similar vein, when interpreting altmetrics, consistency, provenance, and context are of the utmost importance. When considering consistency, article-level metrics providers have "the right to collect metrics as needed for their purposes, but as article-level metrics consumers, we should be able to compare data from the same source across providers" (Chamberlain, 2013, p. 9). Provenance, which provides the ability to independently verify data, can be tracked via URLs ("takes you directly to the human-readable page...from where the data was collected" (Chamberlain, 2013, p. 10)) and via identifiers ("not URLs but can be used to track down an object of interest in the respective database/service where the identifier was created" (Chamberlain, 2013, p. 10)). Context, in particular the audience for whom the metric was created, must also be considered. "The single Altmetric.com score is at first appealing given its apparent simplicity. However, if article-level metrics are to avoid the pit-falls of the Journal Impact Factor, we should strive for meaningful article-level metrics, important to different stakeholders, that retain their context (e.g. tweets vs. citations)" (Chamberlain, 2013, pp. 11–12).

As a result of both the diversity of data sources and the need to consider consistency, provenance, and context, the potential for bias in altmetrics should also be guarded against. Basing altmetrics on a single source of data (e.g. Zotero or Mendeley) creates bias in that not all researchers use open source citation managers. Basing altmetrics on measures of social media biases the results toward researchers who use social media (and some do not). Also, the value of individual online dialogs (e.g. blogs, Twitter, whatever comes next) has not been well established (Galligan & Dyas-Correia, 2013).

Finally, as has already been mentioned, some altmetrics are more easily gamed or maneuvered than others (Carpenter, 2014; Galligan & Dyas-Correia, 2013; "H-index," 2014), e.g. Google Scholar citations (Davis, 2012). However, at least one researcher has suggested that the sheer volume of data on which altmetrics are based may alleviate this (Kelley, 2012).

Thus, despite the new ways of measuring impact that altmetrics gives us, users must still pay attention to what it is exactly that is being measured. There needs to be a distinction made between altmetrics and attention metrics because using attention metrics measures the amount of attention something gets, which is different from measure the quality of that thing. There is research to show that attention, especially social media attention, is not a good measure of quality. "As one of the better metaphors I heard suggests, measuring attention tells us how well the movie did at the box office, when what we really want to know is whether it is any good" (Crotty, 2014, p. last para). Although he is in the minority, Crotty's anecdotal evidence suggests that "there seems to be little traction for serious use of attention metrics in researcher assessment" (Crotty, 2014, para. 22).

Use in academic libraries

Altmetrics are a natural extension of what libraries and librarians already do. For example, tracking user behavior (like page clicks or downloads) to "spot trends and make informed decisions based on deep quantitative evidence" (Galligan & Dyas-Correia, 2013, p. 58) are activities that electronic resources librarians have engaged in for years. In academia, using big data to "present an integrated view of how one unit of content or on researcher has moved across the digital landscape in a series of actions or digital conversations" which can "then be scaled up to clusters of articles, groups of researchers, or potentially even a combination of the two" (Galligan & Dyas-Correia, 2013, p. 58).

Collection Development

Judy Luther's (2014) statement that Ebsco's purchase of Plum Analytics represents an endorsement of altmetrics in general is further evidence of the a growing realization among academic collection development and e-resources librarians that "By providing an altmetric overlay for journal usage that will complement the standard COUNTER statistics provided by publishers" (Galligan & Dyas-Correia, 2013, p. 58). This is what Mendeley currently does and is likely what Ebsco hopes to do and sell with Plum Analytics. Some of the "Metrics Plum already provides are 'established citations and usage as well as altmetrics:

- Captures—bookmarks, favorites on slideshare, followers on GitHub, groups in Mendeley, etc.
- Mentions—reviews on Amazon, SourceForge, links from Wikipedia, comments on YouTube, etc.
- Social Media—Tweets, shares, recommendations on Figshare, ratings on SourceForge, etc.

While these categories are similar to other altmetric providers, Plum plans to expand them" (Luther, 2014, sec. "Plum's Role").

Institutional Support

The use of altmetrics to measure researcher impact is also an activity in academic libraries that has gained interest in recent years. Return on investment has become a buzz-word not only in academic libraries but in institutions of higher education in general in a climate of ever increasing focus on the presentation of evidence to support public expenditures on higher education. Knowledge of altmetrics makes libraries and librarians central to the role of libraries' and librarians' new educational role: helping researchers and institutions to understand and manipulate their own impact. In addition, of interest to academic librarians wishing to provide researcher support, is the use of altmetrics by publishers to identify recent trends, by funding/grant-making agencies for decision-making, and for promotion and tenure decisions.

Open Access

Open Access (OA) has played a major role in the development of altmetrics. OA journals were among the first to provide article-level metrics (e.g. JMIR: Journal of Medical Internet Research and

PLoS) based on "open data or open source systems" (e.g. Mendeley and institutional repositories). Crowd-sourced peer-review "depends on openness and accessibility of the content to be reviewed" (Galligan & Dyas-Correia, 2013, p. 60). Freely available services like ResearchGate, Figshare and F1000 (Faculty of 1000) are "open [repositories] for all types of research output" (Galligan & Dyas-Correia, 2013, p. 60). It should also be noted that few altmetrics existed for e-books, mainly because "they are generally much more substantial works containing many individual ideas" and thus perhaps not the appropriate unit of analysis to which to apply current altmetrics (Galligan & Dyas-Correia, 2013, p. 60).

Final Thoughts: Caution and Anticipation

Throughout this paper I have tried to temper the exciting possibilities that altmetrics present to libraries with the need to proceed cautiously with their implementation and use. Galligan and Dyas-Correia (2013) suggest "Some fundamental steps that are required before we begin to see tangible and specific value from these metrics" (p. 60). These include customizing sets of metrics for specific groups of users, recognizing that using multiple sources for determining influence is better than trying to find and use a single source, and identifying the correlations between existing, vetted, metrics and new ones.

To their list I would add the need for standardization for altmetrics similar to those that Project Counter provides for more traditional e-resource usage metrics. And, in fact, there is movement toward such a goal. In June 2013, NISO was awarded a grant by the Alfred P. Sloan Foundation to "explore, identify, and advance standards and/or best practices related to a new suite of potential metrics in the community" (Carpenter, 2014, para. 1). The first phase of this project consisted of a series of free, open in-person meetings in October and December 2013 and January 2014. The first major output of this project will be a white paper describing the outcomes, recommendations, and action items identified during these meetings which will likely be presented at ALA's annual conference and then released in (digital) print in July 2014.

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