

Teaching Undergraduates to Collate and Evaluate News Sources with Altmetrics

Chapter Three of *Teaching about Fake News: Lesson Plans for Different Disciplines and Audiences*

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CHAPTER

THREE

TEACHING UNDERGRADUATES TO COLLATE AND EVALUATE NEWS SOURCES WITH ALTMETRICS

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ABSTRACT

In the digital age of information, undergraduate students often have a difficult time identifying and differentiating among online sources, such as news articles, blog posts, and academic articles. Students generally find these sources online and often struggle to vet them for consistency, context, quality, and validity. In this chapter, we present a new purpose for altmetrics in which librarians teach undergraduates to use altmetrics as a tool to evaluate and differentiate between online mainstream and scholarly sources, which can lead to a deeper understanding of the research process and the engagement and discussion surrounding research as well as an increased ability to evaluate sources more critically. On a more advanced level, students will be able to analyze different levels of inaccuracy and misrepresentation of research from mainstream sources and more accurately identify highly sensationalized research topics from mainstream sources, seminal works of research, and deliberately misleading information and/or fake news.



Introduction

Over the past decade, the meaning of the term “fake news” has shifted from a term to specifically refer to intentionally—and often obviously—fabricated news to a term that comprises more varied types of inconspicuously misleading sources of information, such as manipulation, advertising, and propaganda.¹ Research is often cited and strongly misrepresented in fake news sources, and yet the structure and presentation of the information are so convincing that it can be tempting for the layperson to take the information at face value. Even the best of researchers have been misled, and without effectively detaching from their assumptions and emotions during the research process, researchers are at the mercy of their biases. Altmetrics, an emerging research evaluation tool for assessing the online attention to research, offers an opportunity for researchers, instructors, and students to break free of their information echo chambers to discover online discussions and activity around research from multiple perspectives. When encountering and evaluating fake news sources, students may find the research mentioned in an online source does not provide a link or a citation to the research output. Furthermore, altmetrics data providers may not track obscure or disreputable news sources, and they certainly cannot track the mention to a research output when there is a missing link. Thus, teaching students the process of locating the original research output and using altmetrics to determine the consistency—or lack thereof—of the claim made by the fake news source is a key step in comprehensively collating and evaluating information sources.

Altmetrics: Definition and Emergence

Altmetrics Defined

Altmetrics can be defined broadly as the measure of the volume of online attention to research. The term “altmetrics” was originally coined in a tweet by the ImpactStory and Unpaywall co-founder Jason Priem in 2010 to replace the longer term, article-level metrics (ALMs).² However, over time, altmetrics have come to represent a more specific class of ALMs, because ALMs encompass traditional citation-based metrics (or bibliometrics), altmetrics, and usage data, so long as they are assigned to *individual research outputs* and not an author, journal, or other higher level.³ Altmetrics are *alternative* to bibliometrics because they track attention to research that is *outside* academic attention from traditional research outputs (i.e., citations).

In this chapter, “altmetrics” is used to refer to *alternative* metrics outside of the realm of bibliometrics rather than the more general term, ALMs. Furthermore, it is worth noting that ALMs are generally understood to apply to traditional scholarly journal articles as well as other types of individual research outputs, such as conference proceeding papers, data sets, monographs, books, book chapters, presentation slides, posters, theses and dissertations, and so on (figure 3.1). The three major types of ALMs include citation counts, usage statistics, and altmetrics (figure 3.2).

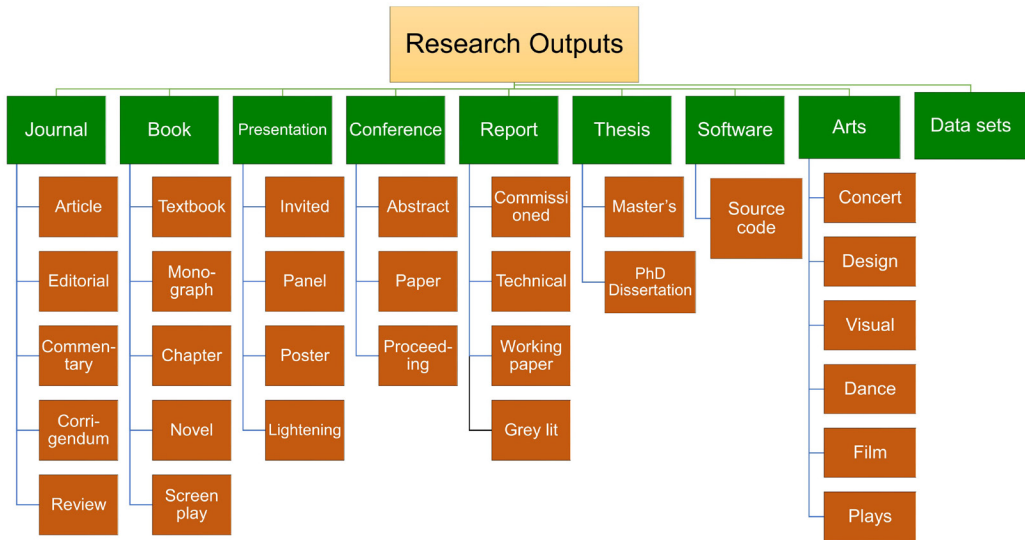


Figure 3.1.

Examples of types of research outputs. Image by Rachel Miles, CC-BY.

Examples of Online Attention to Research (altmetrics)

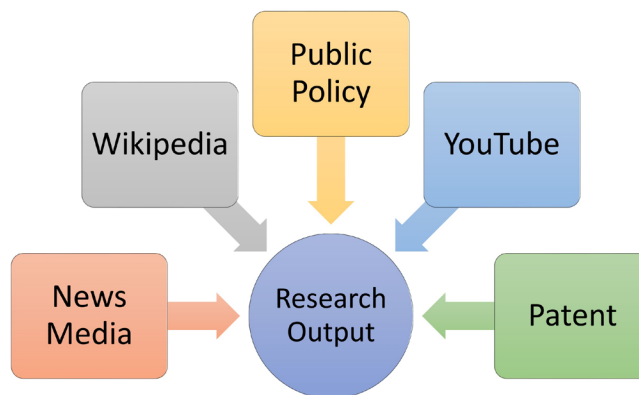


Figure 3.2.

Examples of online attention to research. Image by Rachel Miles, CC-BY.

In general, altmetrics may show a different *type* of academic engagement as well as non-academic or societal impact.⁴ However, the general consensus is that altmetrics show *attention* to research without implying sentiment of that attention, and altmetrics data providers, such as Altmetric, typically refer to altmetrics as *complementary* rather than a replacement for or a prediction of bibliometrics. Altmetrics usually falls under the periphery of article-level metrics, and data providers track different research outputs and

different sources of online mentions to research. The two most well-known data providers are Altmetric.com, or Altmetric, and Plum Analytics, or PlumX. Depending on the data provider, altmetrics sources are categorized differently. PlumX metrics are separated into five categories: citations, usage, captures, mentions, and social media.⁵ Altmetric simply lists the sources they track for online attention to research.⁶ Without getting into too many of the granular details, Altmetric and PlumX both track the following, although their sources vary:

- scholarly citations
- patent citations
- blog mentions
- news media mentions
- Wikipedia references
- YouTube mentions
- public policy citations
- social media mentions/shares

The main differences are mostly explained by their origins. Altmetric, the first altmetrics data company, gained early support from Digital Science and mainly worked with the publishing world, whereas PlumX mainly started with a focus on institutions.⁷ Hence, it is much more common to see the well-recognized Altmetric donut with the accompanying Altmetric Attention Score (AAS) on publishers' sites than the PlumX Widget and Metrics. There is relatively little overlap of Altmetric and PlumX data,⁸ and therefore, investigating altmetrics from both data providers would be a practical and useful information evaluation exercise for students.⁹

Emergence of Bibliometrics and Altmetrics

Altmetrics are in their infancy with the first data providers, ImpactStory and Altmetric, emerging in 2011, a year after the term was coined. In contrast, the term “bibliometrics” was coined in the late 1960s *after* the first bibliographic index, the Science Citation Index (SCI), was created in 1961 by the chemist Eugene Garfield, often heralded as the father of bibliometrics. In his 1955 groundbreaking paper, Garfield proposed the Journal Impact Factor (JIF).¹⁰ In 1975, Garfield's Institute for Science Information (ISI), now Clarivate Analytics, began to publish the subscription-based *Journal Citation Reports (JCR)* along with those journals' JIFs, a metric that reflects the average number of citations an article receives in that journal over a two-year period. Bibliometrics was grounded in the world of print, and Garfield's work advanced bibliometrics as a mechanism to enable searching, finding, and discovery of scientific literature,¹¹ which was further accelerated by rapid technological development that gave rise to computerization and automated machine indexing.¹²

The original purpose of the JIF was to evaluate journals for their potential inclusion in *JCR*; Garfield created the JIF and *JCR* for three primary reasons: librarians could more easily make journal selections for collection development purposes; scientists could more

easily find references to their own work; and scientists could also discover other researchers conducting similar research in their fields, which could potentially prevent unnecessary duplicate studies and lead to more collaborations.¹³ In academia, the JIF is often perceived as a trusted, well-respected proxy for research quality, but there is also a growing number of academics who view the JIF as a highly controversial metric that is misused and abused by university administrators, research funders, journal editors, university rankers, publishers, and other research evaluators for unfair evaluation, promotion, tenure, funding, and hiring decisions.¹⁴ Overall, though, despite the known misuse and abuse of the JIF, most academics do not seem to be alarmed by its uses or possibly even aware of its limitations and controversies.¹⁵

In response to some of the misuses and abuses of the JIF and other research impact metrics, a handful of international initiatives to move toward a more responsible research assessment culture have emerged, most notably the San Francisco Declaration on Research Assessment (DORA),¹⁶ the Leiden Manifesto,¹⁷ and *The Metric Tide*.¹⁸ As a result, academia is showing gradual cultural shifts, such as the updated Wellcome Trust Open Access (OA) policy and its guidance to funded organizations, stating that they must “implement responsible and fair approaches for research assessment.”¹⁹

Similar to bibliometrics, altmetrics arose in response to evolving technologies that allowed scholars to more easily track and measure mentions and citations to research online. Altmetrics was preceded by webometrics by about a decade, which are similar but require more manual and labor-intensive data collection through commercial search engines.²⁰ Unlike bibliometrics, altmetrics also arose as a means to track the growing diversification of digital scholarly communication channels outside of traditional scholarly outputs,²¹ such as blogs and social media engagement. Another key difference is that altmetrics tracks mentions to research that include voices from *both* academia and the public.²² In addition to emerging digital technologies, an important factor that led to the emergence of altmetrics is the so-called “impact agenda” of many government-led initiatives around the world to demonstrate the economic and societal impacts of research to the public with quantitative evidence.²³

Today, compared to altmetrics, studies on citation-based indicators and bibliometrics still dominate the field of research evaluation, scientometrics, and informetrics, and citation-based indicators and tools are also more often included in major research analytic products, such as SciVal and InCites. Although the field of altmetrics is steadily growing, they are not yet widely used in review, promotion, or tenure evaluations, and even when they are, evaluators do not usually consider them to be valuable indicators of assessment.²⁴ By and large, much has been learned about altmetrics since its inception in 2010, but there is still much to be learned and understood regarding what they can tell us about research. For now, societal impact can only be inferred from altmetrics by carefully tracking and investigating the research output’s attention, the sources of the attention, the audiences, and the context and sentiment surrounding the attention,²⁵ which is also a valuable process and skill for students to learn when evaluating sources that mention research.

Altmetrics as an Evaluation Tool

Using Altmetrics for Evaluating Sources Helps Students

As mentioned in the introduction, evaluating sources is difficult for everyone, not just students. There has not been much discussion regarding instruction librarians' use of bibliometrics and altmetrics as evaluation tools when working with undergraduate students except for an ACRL "Tips and Trends" piece.²⁶ For all researchers, trying to evaluate a source in isolation makes the evaluation process even more difficult, especially if the source being examined is in a field outside of a researcher's knowledge base. The context surrounding a resource can help a researcher make a more critical and accurate evaluation, but finding that context adds to the complexity of the research process. However, learning to use altmetrics as an evaluation tool can make the process a bit easier.

Discussing the research process and the ethical conduct of research is suggested, including concepts like fabrication, falsification, and plagiarism prior to teaching students to use altmetrics as an evaluation tool. For example, providing a retracted source as an example can illustrate the retraction process. In some cases, legitimate mistakes are found, and researchers are given a chance to amend their work. Amendments to works can serve as even better class examples, as the corresponding online engagement can illustrate the journey from publication success to retraction to amendment. Furthermore, this type of exercise provides an opportunity for students to understand research ethics and why and how papers are retracted, the differences between retraction and redaction, and that retraction is not an automatic blacklist.

While altmetrics can help with the discovery process, evaluating the headlines, titles, context, and claims require additional evaluative skills. For instance, students should understand that both journalists and researchers are searching for truth, but journalists tend to seek certainties while researchers deal in probabilities; journalists also tend to seek quick answers, while researchers seek answers to complex questions over much longer periods of time. As a result, their intentions and purposes do not always align,²⁷ and often, scientific claims are overstated in the news, or news stories do not cover other relevant, better-designed research that could refute their headlines' shocking narratives. For instance, in economist Emily Oster's book *Cribsheet*, which investigated causal relationships, and at times controversial claims, of the effects of early parenting decisions on children's later successes and well-being in life, she laments, "'Report: Formula-Fed Children More Likely to Drop Out of High School' is a more clickable headline than 'Large, Well-Designed Study Shows Small Impacts of Breastfeeding on Diarrheal Diseases.'"²⁸

During the evaluation process, especially for novice researchers, distinguishing between sensationalized topics and seminal works can be a challenge. Students can use altmetrics as an evaluation tool to uncover the meaning behind high citation counts and the AAS, for example. More advanced undergraduate and graduate students can use more complex article-level citation indicators, such as field-normalized citation impact indicators and

percentiles, to understand where a work stands in its field and in academia. Works become seminal works largely because they are often groundbreaking in some way. The result is that they can be cited indefinitely, leading them to achieve very high citation counts over several years or decades. However, a high citation count does not always mean the work is “good.” A highly problematic work or a now disproven but “accurate-at-the-time work” could continue to be cited to illustrate flaws, mistakes, or even positive advancements in a field.

Overall, learning to use altmetrics as an evaluation tool provides an active learning opportunity for students to practice and explore their understanding of the research process and the broader online discussions surrounding research. Using what we will call a “tracing mechanism,” students can trace metrics and linked sources from an online source that talks about research. This means they are following the reverse of traditional online research by first finding an online source that mentions a piece of research, tracing the research output back to its source, and then discovering the online attention to that research through altmetrics. This approach will allow students to explore the context surrounding the online attention and engagement, and it can aid in the identification of potential propaganda. They can also critically appraise the online sources that mention research that they discover either through search engines or through altmetrics. See figure 3.3 for an example of how the tracing mechanism works when employing the use of altmetrics.

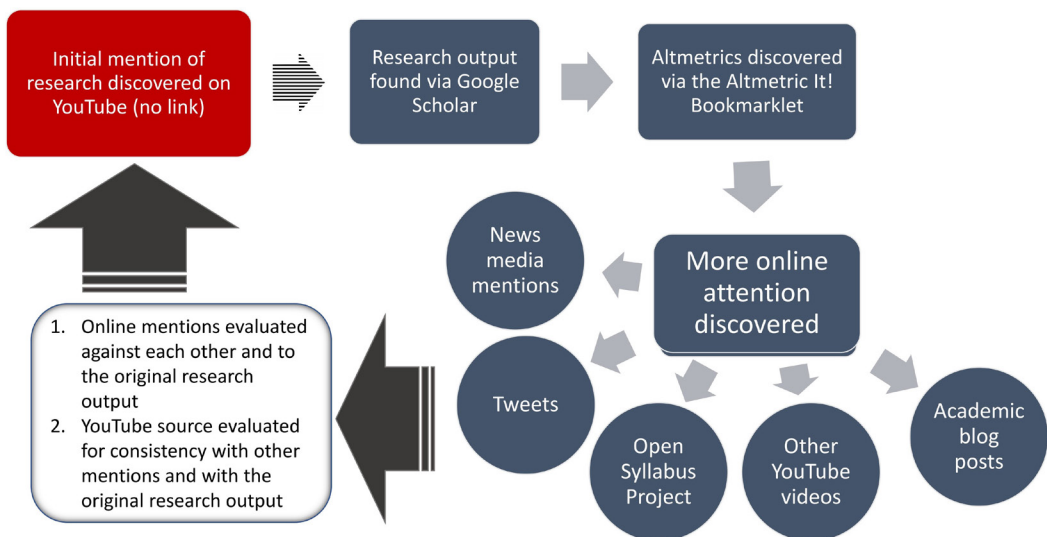


Figure 3.3

An example of how the tracing mechanism works when tracking down a mention to a research output, discovering other online attention via altmetrics, and then evaluating those sources. Image by Rachel Miles, CC-BY.

Pedagogical Underpinnings for Evaluating Sources Using Altmetrics

The tracing mechanism described above, which is included as part of the learning activity at the end of this chapter, is essential to our approach for teaching students to use altmetrics as an evaluation tool and is theoretically grounded in Kolb's Experiential Learning Theory. Following his cycle of experiential learning, students progress through four stages: concrete experience, reflective observation, abstract conceptualization, and practical application.²⁹ Students engage in the concrete experience during the introductory portion of the learning activity, where they will likely encounter concepts related to the research process, research ethics, altmetrics, and information evaluation. This portion ends with students locating the original research article. The reflective observation occurs when students explore diverse perspectives that mention the original research output. Students' abstract conceptualization occurs when they critically analyze the online engagement of the original research article. And, lastly, students' practical application occurs when they make their final evaluation or determination of the source using altmetrics.

While the student experience is grounded in Kolb's theory, the learning objectives were designed using Bloom's Revised Taxonomy of Cognitive Outcomes and follow an upward trajectory.³⁰ Using Bloom's Revised Taxonomy provides librarians with the flexibility to adapt the learning activity according to their students' needs by revising the outcomes to include higher or lower-level verbs and adjusting lesson plans to coincide with the revised outcomes.

Just as the learning activity and outcomes can be adjusted based on student need, the librarian can also opt to focus on one or more of the following frames: Scholarship as Conversation, Searching as Strategic Exploration, and/or Authority is Constructed and Contextual from the *ACRL Framework for Information Literacy in Higher Education*.³¹ Because altmetrics focus on the online attention of a particular source (i.e., what are others saying about the source), Scholarship as Conversation aligns nicely. Because the tracing mechanism requires students to locate an original source and its corresponding online engagement, it can be linked to Searching as Strategic Exploration. Lastly, because evaluating a source using altmetrics requires students to make decisions regarding the source and the online engagement that surrounds it, it connects to Authority is Constructed and Contextual.

Challenges Librarians and Instructors may Face Teaching with Altmetrics

Librarians and other instructors can offer a clearer lens to the scholarly conversation, or they could further distort the interpretation of scholarly literature through any inaccurate or uninformed understandings of bibliometrics and altmetrics. For example, instructors

and librarians could inadvertently teach altmetrics as a scoring tool to gauge the importance of research to the public. Arguably, on the surface, this is what altmetrics does, but beneath that surface lies the metaphorical iceberg of the complex engagement with research and all its layers of context. For instance, a research output with a high AAS could have similar sentiment and consensus across most of the news articles mentioning it. However, the research article's results or conclusions could be sensationalized across *all* news sources as a result of the first journalist's misinterpretation of the research. An advanced understanding of altmetrics and a preliminary understanding of bibliometrics is vital to the undergraduate instructor.

In addition to educating themselves regarding the history behind bibliometrics and altmetrics, librarians can also familiarize themselves with the differences between metrics-literate scholars and non-metrics-literate scholars as a way to build their metrics literacy. A metrics-illiterate scholar might be filled with joy when seeing likes, shares, saves, and especially scholarly citations of their works without asking any questions. However, a metrics-literate scholar might react very differently and have questions, such as who was sharing their work, what was said about it, how and why it was communicated, whether it was communicated effectively and accurately, whether it was sensationalized, and so on.

For librarians considering the inclusion of altmetrics in their instruction, possessing a general understanding of the background and history explained previously is a good starting point. They may consider preparing themselves to help graduate students and faculty regarding altmetrics and their practical application, as altmetrics can be most useful for individual researchers investigating the context of the online attention to their research as well as for publishers and institutions to benchmark and assess the reach of research across various online sources.³²

Instruction librarians often teach undergraduate students how to engage with and share information about research via a *secondary source*, such as a news article, a YouTube video, or a blog post, before reading the original research output. This approach aligns with how the public also interacts with sources; it also coincides with the phenomenon that social media has become an informal channel for communicating research among *academics* rather than a broader communication platform between academics *and* the public (figure 3.4).³³ Understanding that social media and other altmetrics sources act as a window into informal academic discussions, students can also be introduced to the concept that alternative media sources can have validity and that the authors of these alternative media can be authoritative voices, despite their non-credible appearance.³⁴ Until new evidence shows a more direct connection between academics and the public in online communication platforms, mass communication appears to still be the best available means for effectively communicating and disseminating research to the public. If the original research output is not linked in the secondary source, then search skills are critical in the information evaluation process, especially if crucial information is missing, such as the research article title, journal title, publication date, author names, and so on.

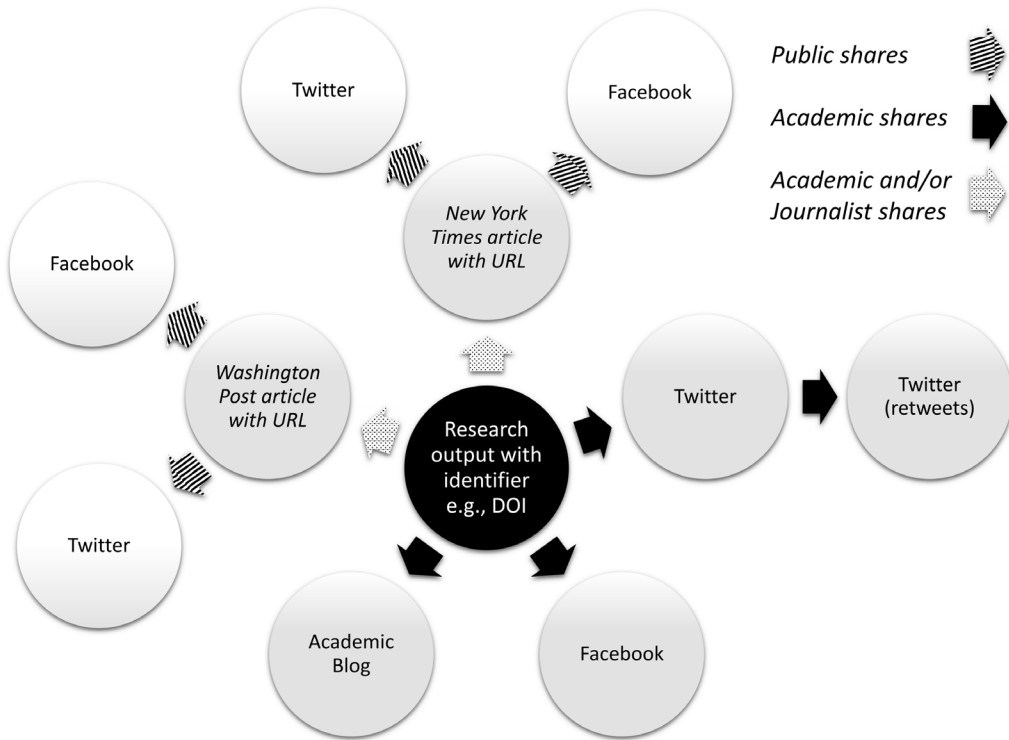


Figure 3.4.

How research is typically shared online by academics, journalists, and the public, through mainstream news media and social media. Image by Rachel Miles, CC-BY.

Implications for Practice and Limitations of Altmetrics

The indexes of research outputs and online sources tracked by altmetrics data providers have continued to expand over the past decade, but problems persist with altmetrics. One of the most prominent problems with altmetrics is that online sources do not always link out to the original research outputs, which makes it much more difficult to track, especially without appropriate data harvesting skills. Mainstream news media sources have improved their practices of linking to research outputs over the past decade, but studying historical data of the discussion of research in the news, for example, is not easily accomplished, at least not with altmetrics data (figure 3.5, showing the number of online mentions via Altmetric sources). Studies, such as those in the discipline of mass communications, would likely be topical and narrow in their focus. Altmetrics can, however, be valuable in studying and understanding the current online discussions around research in the ever-expanding online digital space. However, it is also important to understand that there are significant biases in altmetrics, such as the fact that there is no usage of Facebook and rare usage of Twitter in China, there are differences in social media usage between age groups and academic fields, and certain research papers are more likely to

be promoted and communicated by authors and publishers than others (e.g., diet and nutrition research compared to theory-based mathematical research).³⁵

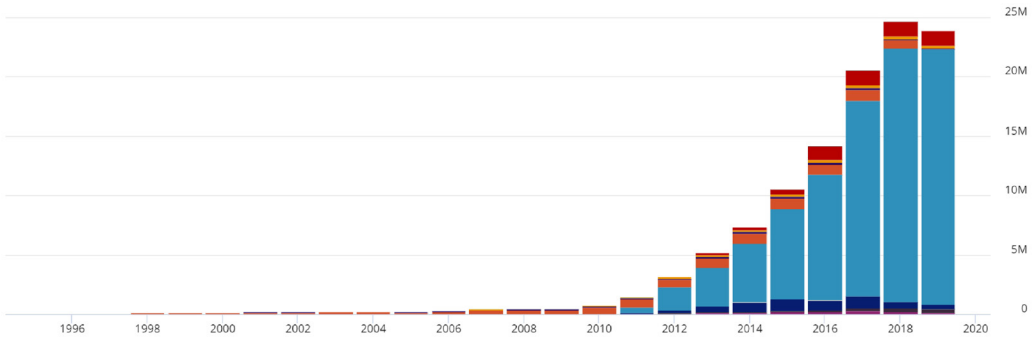


Figure 3.5

Number of online mentions to research in the millions; from top to bottom: red is mainstream news media, yellow is blogs, purple is public policy, orange is patents, light blue is Twitter, dark blue is Facebook. Graph generated from Altmetric Explorer; Copyright Altmetric, used under the fair use provision.

Some critics have also pointed out that altmetrics acts as a “dirty filter” for finding “quality” research, especially in the case of the AAS, which provides a quantitative measure of online attention. Such a filter, such as the AAS filter on Dimensions, could lead researchers and students to make hasty decisions about what to select for their own research without actually reading or evaluating the content, an identical criticism against the JIF; the main difference is that the JIF is already widely used in this way while altmetrics is not, at least not yet. One critic espoused that such filters could lead medical practitioners and academics to read and rely on sensationalized and dubious research with questionable methodology, and that altmetrics “are numbers generated by people who don’t understand research.”³⁶ The authors of this blog piece, however, did not mention that the AAS, similar to citation-based indicators, does not account for sentiment within the context of the attention, which can be positive, negative, or neutral.³⁷ In addition, articles with “sexy” or sensationalized titles, otherwise known as “academic clickbait,” do garner more attention from the news media and social media and thus usually acquire higher AAS.³⁸ These types of caveats should be part of the discussions in academia and in the classroom to help create a healthier culture around research metrics.

Altmetrics has the potential to influence the academic culture of formal research evaluation, potentially for good or bad, depending on the likelihood and progress of dialogues between metric experts and evaluators (e.g., university administrators, research funders, rankers, etc.). While not yet refined, altmetrics could potentially provide a useful science communication assessment tool to determine where, when, and possibly even why certain research is being shared and communicated more broadly and effectively. And, perhaps

one of the first steps toward this can involve instruction librarians integrating altmetrics (and with guidance or training, bibliometrics) into their instruction with students, some of who will be in the early stages of their academic and research careers. Learning how altmetrics acts as a complementary information evaluation tool to track and assess academic and public engagement with research is the first step in exploring altmetrics with novice researchers.

Conclusion

There is an array of benefits from developing an understanding of altmetrics. Altmetrics provides a path for considering the scholarly conversation surrounding a topic and the associated online engagement of a particular source. It also serves as an example for students on what it looks like to enter particular conversations, which often becomes clearer for students once they have explored how mentions and shares can further a topic, issue, or work. Additionally, they provide students a chance for understanding the depth of the impact behind some seminal works and for more easily identifying sensationalized topics that may be lacking substance, which is especially helpful in this era of “fake news.” And, perhaps most important, they provide students an avenue for exploring a topic while intentionally considering multiple perspectives and stepping outside of their own echo chambers.

Altmetrics have the potential to make us much more informed researchers, teachers, and students. While there are some challenges associated with altmetrics, as long as librarians and instructors are properly educated on research impact metrics prior to teaching students, the benefits of integrating altmetrics into the library instruction classroom far outweigh the problems, especially since the risks of ignoring them include altmetrics being misinterpreted or dismissed by future professionals and researchers. In order to support librarians and instructors, we are proposing the creation of a *Framework for Research Impact Metrics Literacy*. This framework would provide structure and support for appropriately and responsibly evaluating and investigating research, the conversations around research, and teaching others to do so as well.

Learning Activity

Using Altmetrics to Evaluate Pseudoscience News Media

Student learning outcomes:

1. Locate the original research article (e.g., Wakefield’s study) mentioned in the video using an online metrics tool (e.g., Dimensions (free) [<https://app.dimensions.ai/discover/publication>], Plum Analytics (subscription) [<https://plumanalytics.com/>],

or Altmetric Explorer for Institutions (subscription) [<https://www.altmetric.com/products/explorer-for-institutions/>])

2. Intentionally explore diverse perspectives that mention the original research output (e.g., Wakefield's study) within an online metrics tool; online attention to research explored can include other scholarly as well as popular sources.
3. Critically analyze the online engagement of the original research article (e.g., Wakefield's study) and the other outputs/perspectives explored to determine the video's relevance, accuracy, purpose, and bias based on what you've just explored.

Brief description of activity:

Students view a sensationalized video that acknowledges original research. Through their location of the original research, exploration of other sources that mention the original research, and use of metrics, students should be more prepared to determine the video's relevance, accuracy, purpose, and bias based on their findings.

Time to run activity:

30 minutes (this time can vary if a different video example is selected)

Preparation:

- Share the following video with students:
 - CDC Whistleblower Revealed [<https://www.youtube.com/watch?v=sG0tDVilkUc&t=9s>]
- Familiarize yourself with the related original research article and its identifiers.
 - <https://www.thelancet.com/journals/lancet/article/PIIS0140673697110960/fulltext>
 - [http://dx.doi.org/10.1016/s0140-6736\(97\)11096-0](http://dx.doi.org/10.1016/s0140-6736(97)11096-0)
 - <https://www.ncbi.nlm.nih.gov/pubmed/9500320>
- Consider creating slides or handouts to walk students through this activity.

Teaching plan:

- Play video for students (or assign for them to watch before coming to class that day). (10 min.)
- Demonstrate how to search and locate specific sources and outputs that mention those sources in the metrics tool of your choice, such as Dimensions, Plum Analytics, or Altmetric Explorer for Institutions. (5 min.)
- Provide time for students to search and locate specific sources and outputs that mention those sources. (7 min.)
- Group discussion of students' evaluation of the video now that they have explored the original research, other outputs mentioning that research, and the metrics/online engagement regarding the source. (5 min.)

- Reflection: Have students consider if/how their evaluation of the video changed before and after this activity. (3 min.)

Helpful hints:

This example may not be relevant to all courses. Selecting an example that has been sensationalized and is relevant to the class content and cites or contains information regarding an original piece of research is ideal.

Rather than using Dimensions as a database for locating an article, another database can be used to initially locate the article, and the free Altmetric It! Bookmarklet (<https://www.altmetric.com/products/free-tools/bookmarklet/>) can be used by students to explore the online attention to the research output.

Recommended readings:

Association of College and Research Libraries. “Altmetrics and Library Outreach.”

ACRL Liaisons to Professional Associations: Major Issues, Talking Points, and Resources, July 21, 2017. <https://acrl.libguides.com/c.php?g=452958&p=3094032>. This LibGuide contains useful talking points, links to platforms, and additional readings associated with library work related to altmetrics as well as helpful readings about understanding the meaning and implications for practice when working with altmetrics.

Coates, Heather. “Advice from a Librarian: How to do Successful Altmetrics Outreach.” *Altmetric* (blog), June 9, 2015. <https://www.altmetric.com/blog/advice-from-a-librarian/>.

While the title of this source may lead librarians and instructors astray if their focus is teaching in the classroom, successful outreach is often the first step in trying something new in the classroom. This source also contains links to other helpful sources that can be used to deepen one’s understanding of altmetrics.

Holmberg, Kim, Sarah Bowman, Timothy Bowman, Fereshteh Didegah, and Terttu Kortelainen. “What Is Societal Impact and Where Do Altmetrics Fit into the Equation?” *Journal of Altmetrics* 2, no. 1 (December 18, 2019): 6. <https://doi.org/10.29024/joa.21>.

This journal article reviews the literature on altmetrics as it relates to finding and attributing societal impact with altmetrics data. It also discusses the interpretations of societal impact and why it is so difficult to quantify and effectively demonstrate such a broad concept, which can range from cultural, economic, and educational impacts. This is excellent background reading for prepping your altmetrics information evaluation lessons.

Roemer, Robin Chin, and Rachel Borchardt. *Meaningful Metrics: A 21st Century Librarian’s Guide to Bibliometrics, Altmetrics, and Research Impact*. Chicago, IL: ACRL, 2015. <https://www.alastore.ala.org/content/meaningful-metrics-21st-century-librarians-guide-bibliometrics-altmetrics-and-research>.

This book (available in print and as an Open Access PDF) offers a practical

guide to bibliometrics, altmetrics, research impact, and research evaluation. It is written for a range of readers—from the novice to the expert scholarly communication librarian. It covers the advantages and limitations on a host of metrics, discusses the potential meaning behind the metrics, and elaborates on why “impact” is such an ambiguous term in the first place.

Thelwall, Mike. “Measuring Societal Impacts of Research with Altmetrics? Common Problems and Mistakes.” *Journal of Economic Surveys* 34 (June 24, 2020). <https://doi.org/10.1111/joes.12381>.

This journal article is helpful background reading on understanding altmetrics’ values and limitations, such as the inevitable biases in altmetrics; for example, altmetrics data is not robust or comprehensive, especially on a global scale, and, therefore, attention to research should be interpreted with care. Understanding these points will help guide the instructor to structure their lessons around exploring these “problems and mistakes” and challenge their students to think more critically about the sources of information and data.

ENDNOTES

1. Edson Tandoc, Zheng Lim, and Rich Ling, “Defining ‘Fake News’: A Typology of Scholarly Definitions,” *Digital Journalism* (August 30, 2017): 1–17, <https://doi.org/10.1080/21670811.2017.1360143>.
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