## Contents

Preface ix
Acknowledgments xi

### PART I  ■  OVERVIEW OF OPEN PRAXIS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Concept of Openness in Scholarship</td>
<td>VICTORIA MARTIN, Salisbury University</td>
</tr>
<tr>
<td>2</td>
<td>An Overview of the Open Access Movement in Canada</td>
<td>ROSARIE COUGHLAN, Queen’s University, Canada</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MARK SWARTZ, Queen’s University, Canada</td>
</tr>
<tr>
<td>3</td>
<td>Open Scholarship and Climate Change in the Asian World</td>
<td>PEGGY SPITZER CHRISTOFF, Stony Brook University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JAMIE M. SOMMER, Stony Brook University</td>
</tr>
</tbody>
</table>
4 | The Emperor’s New Clothes
Open Access and Intersectionality
LAURA FRANCABANDERA, Credo Education, Scotland

5 | Adopting an Open Access Policy at a Four-Year Comprehensive College
MARY JO ORZECH, SUNY Brockport
KIM L. MYERS, SUNY Brockport

PART II ■ OPEN ACCESS PUBLISHING

6 | Open Access Funding Models and the Future of Library Science Journals
LAURA COSTELLO, Rutgers University

7 | Challenging Library Support of Article Processing Charges
HEIDI ZUNIGA, Colorado State University
LILIAN HOFFECKER, University of Colorado

PART III ■ REPOSITORIES

8 | Evolution of an Institutional Repository
A Case History from Nebraska
PAUL ROYSTER, University of Nebraska-Lincoln

9 | Open Access 3D Printing Repositories
LAUREL SCHEINFELD, Stony Brook University
JOAN WAGNER, Touro College
KEITH PARDINI, Touro College

alastore.ala.org
PART IV  ■ OPEN EDUCATIONAL RESOURCES

10  |  Introducing OERs  143
   A Case Study at Bay Path University
   RACHEL BAUM, Bay Path University

11  |  Opening the Canon  157
   OERs in Literary Studies
   MELISSA E. JOHNSON, Augusta University
   RHONDA ARMSTRONG, Augusta University

12  |  Emphasizing the Social Aspect of Open Access Textbook Adoption  171
   JESSICA MARTINEZ, University of Idaho
   JYLISA DONEY, University of Idaho
   RICK STODDART, University of Idaho

13  |  Open Illinois  195
   Supporting Open Educational Resources as a Consortium
   KATHY LADELL, Northern Illinois University
   ANNE GRENON CHERNAIK, College of Lake County
   ANNE CRAIG, Consortium of Academic and Research Libraries in Illinois
   ELIZABETH NELSON, McHenry County College
   ANNE SHELLEY, Illinois State University
   JANET SWATSCHENO, University of Illinois at Urbana-Champaign

PART V  ■ OPEN DATA

14  |  Open Science and Open Data  211
   What Can We Learn from the Open Access Movement?
   JESSICA CLEMONS, University of Buffalo

alastore.ala.org
15 | Raising the Visibility of Protected Data 225
A Pilot Data Catalog Project
ERIN D. FOSTER, Indiana University
HEATHER L. COATES, IUPUI University

16 | Health Sciences Libraries 245
Open Data and Tools for Improving Health
JESSICA A. KOOS, Stony Brook University
JAMIE SARAGOSSI, Stony Brook University
GREGG A. STEVENS, Stony Brook University
LAUREL SCHEINFELD, Stony Brook University

About the Authors 261
Index 267
Open Praxis is guided by intention. We achieve excellence by taking deliberate steps, informed by the past, shaped by the present, and inspired by goals and aspirations born out of ethical practice and the conviction that open access will be the engine of transformation leading to more culture, more research, more discovery, and more solutions to small and big problems.
Overview of Open Praxis
The Concept of Openness in Scholarship

Open scholarship, and the debate about it, bears the certainty of messy understandings, confusion, conflict, misappropriation, and tangential focus. But, it is only in this open sphere that scholarship has any power or potential at all to engage debate and to shift understandings.

—Jessie Daniels and Polly Thistlethwaite, Being a Scholar in the Digital Era

In October 2003, the Public Library of Science (PLOS) published the first issue of its open access journal PLoS Biology, in which Duke University researchers Miguel Nicolelis and Jose Carmena publicized their research findings about how they had trained monkeys with brain implants to move a robot arm with their thoughts, a discovery that might one day allow paraplegics to perform similar functions. That first issue of PLoS Biology received more than half a million hits throughout the world within a few hours after its publication. “Nothing else has ever argued so strongly for open access publishing,” observed the founders of PLoS, Michael Eisen, a biologist at Lawrence Berkeley National Laboratory, Harold Varmus, a Nobel laureate, and Patrick Brown, a biochemist at Stanford University, whose intention was “to do something that fundamentally changes the way scientific research is communicated.”1 If open access succeeds, they continued, “everyone with an Internet connection will be a click away from a comprehensive online public library of scientific and medical knowledge.”2

The philosophy of open access publishing is based on the view that research findings should be freely and immediately available to the worldwide scientific community and to the general public. Because open access publishing practices provide an effective online system for submission, peer
reviewing, and publication, making research papers rapidly available for a worldwide audience, they have gained acceptance primarily in the biomedical sciences, where speed to publication can be crucial, both for scientists, who make the breakthroughs in drug design and new treatments for diseases, and for clinicians, who care for patients suffering from those diseases.

While the open approach to scholarship is becoming increasingly recognized as a valuable approach in knowledge production and distribution, it is not yet considered mainstream in scholarly circles. The debate over openness and what it means for the future of scholarship still goes on. This debate speaks to the evolving nature of openness in scholarship, as well as its complexity and multidimensionality. The term open itself is a vaguely defined word that has been used in a number of ways. As Morozov argues, “few words in the English language pack as much ambiguity and sexiness as ‘open’. . . . Open could . . . mean virtually anything.”

THE CHALLENGE OF DEFINING OPENNESS

There appears to be little consensus among scholars about what exactly constitutes openness in scholarship. There are several ways in which openness can be perceived, as discussed below.

Openness as Transparency

Openness as transparency (being the opposite of secrecy) refers to a new way of conducting research and can be defined as “freedom of access by all interested persons to the underlying data, to the processes, and to the final results of research.” This ideal of transparency does not imply, however, that anyone should be able to access any research information without restrictions. Rather, it implies that there should be “no unwarranted impediments to the widest possible circulation of the ideas and information” (emphasis added). Temporary secrecy may be required for reasons of national security or private industry research, or may be governed by certain norms of scientific inquiry, for example, when researchers need to safeguard the privacy of research participants. The desire to protect ongoing research or to achieve recognition for being first may lead to temporary secrecy as well. Long-term secrecy, however, is universally regarded as a barrier to the advancement of knowledge because it impedes the flow and exchange of information and can result in the duplication of research efforts and an overall lowering of the quality of research.

Openness as a Scientific Norm

The idea of openness as transparency is closely related to Robert Merton’s norms comprising the ethos of open science: “communism,” universalism,
disinterestedness, originality, and skepticism (abbreviated as CUDOS). ⁶ Among these norms, the norm of “communism” (quotes are in the original to distinguish this from ‘communism’ as a sociopolitical ideology) is particularly relevant to the idea of openness because it prescribes that research findings belong to the scientific community. “Secrecy is,” Merton argues, “the antithesis of this norm; full and open communication [is] its enactment.” ⁷

### Openness as an Ethical Obligation

Merton’s norm of skepticism, too, suggests openness since it prescribes that scientists have an obligation to open their work to the scrutiny of their colleagues through peer review and the repetition of experimental findings so they can reach a consensus of opinion regarding facts and theories, which is only possible within the framework of the open communication of research results. ⁸ Scholars also have an obligation to produce knowledge that is socially valuable. Recent developments in research funders’ policies require researchers to prove the societal return on the investment of publicly funded research by introducing the societal impact criterion in the evaluation of grant proposals. For example, all research proposals submitted to the National Science Foundation must include a “broader impact” statement describing how the proposed research would benefit society. These developments are further contributing to the open access movement by urging researchers to seek effective venues for openly sharing their research findings with other scholars and with the public.

### Openness as Freedom of Inquiry

Openness as freedom of inquiry has its roots in the social movement that led to passage of the Freedom of Information Act (1966) and the Electronic Freedom of Information Act Amendments (1996). These acts enforced the public’s rights to have access to official information held by the government and mandated public bodies to ensure that “government decision-making at all levels is transparent, public records are open to public scrutiny, and individuals have rights of access to such information,” ⁹ unless there are reasonable grounds for withholding such information from the public domain.

### Openness as a Mindset

Openness has also been envisioned as a particular mindset associated with such qualities as creativity, intellectual humility, and receptiveness to new ideas. Some of these ideas are enshrined in the Charter of Transdisciplinarity, which defines openness as “an acceptance of the unknown, the unexpected and the unforeseeable.” ¹⁰ Openness is also related to the question of ethics, the goal of which is to support a culture based on open communication and trust, both in professional and personal relationships.
Openness as an Author’s Right

The concept of openness in scholarship is closely connected with the authors’ rights movement, which aims to return the control of scholarly works from publishers back to the authors. In traditional publishing, the transfer of copyright from the authors to the publishers for getting works published via their publishing channels is still a common practice. When transferring the copyright of a work to the publisher, an author actually transfers the entire bundle of exclusive author rights, namely the rights for reproduction, distribution, public performance and display, and the creation of derivative works. SPARC (https://sparcopen.org/) and the Big 10 Academic Alliance (https://www.btaa.org) have developed a tool known as the Author Addendum that helps authors retain certain rights, such as the right to self-archive their works in an open disciplinary or institutional repository. Retaining the right to self-archive is becoming increasingly important to researchers whose works fall under research funders’ public access mandates, which require grant recipients to share the results of their research with the public.

Openness as a User’s Right

Some of the foundational definitions of openness require that information should not only be freely accessible, but also allowed to be freely used and reused. Openness as a user’s right was originally advocated by the leader of the free software movement, Richard Stallman, whose goal was “spreading freedom and cooperation” in order to “make our society better.” According to Stallman, a software program is free if the program’s user has the four essential freedoms:

1. The freedom to run the program in any way, for any purpose
2. The freedom to change the program to suit the user’s needs
3. The freedom to redistribute copies of the program to help others
4. The freedom to distribute copies of the improved version of the program to give others a chance to benefit from the changes

David Wiley’s five basic rights (which he called the “5Rs”) echo Stallman’s four freedoms. Wiley, one of the leaders of the open educational resources (OERs) movement, introduced the idea of 5Rs that define an OER: the rights to retain, revise, reuse, remix, and redistribute. These concepts of Stallman and Wiley put the spotlight on what true openness really means by shifting the emphasis from freedom of access, which by itself is not sufficient, to the freedom to use and reuse information. The Open Knowledge Foundation (https://okfn.org/) adopted a similar definition of open knowledge as “any content, information or data that people are free to use, re-use and redistribute—without any legal, technological or social restriction.”
For works that are not in the public domain, openness as a user’s right depends on the will of the copyright holder, who must consent to open access. Although open access works are free of most copyright and licensing restrictions, their authors are still advised to retain certain rights to these works; for example, the right to prevent the distribution of distorted or misattributed copies of their works. This goal can be easily accomplished by using an open license such as a Creative Commons license.

Openness as Freedom from Cost

The cost of openness—both in terms of time investment and production cost—is often underestimated. The term open is sometimes used synonymously with the term free. Not surprisingly, this misconception has led some authors to believe that open access journals are not peer-reviewed and are of poor quality. This belief may affect the authors’ decision on where to publish their research in favor of subscription-based journals.

While open access publications are intended to be free for readers, open access publishing itself requires cost-recovery models. The cost of producing an open access journal includes managing peer review and editorial control, providing high-quality online access, and technical support. Many (but not all) open access publishers recover these costs by charging authors an article processing fee for each article they publish, and this fee can be paid by the authors themselves or by their institutions.

Openness as a Technological Advance

Lastly, “openness” has been described as a phenomenon that is simply taking advantage of digital and networked technologies. Regazzi argues that the very existence of open access is due to one factor—Internet technology. Veletsianos and Kimmons posit that one of the assumptions about open scholarship is that it is often treated as “an emergent scholarly phenomenon that is co-evolutionary with technological advancements in the larger culture.” Burton describes an “open scholar” as “not simply someone who agrees to allow free access and reuse of his or her traditional scholarly articles and books, [but someone] who makes their intellectual projects and processes digitally visible and who invites and encourages ongoing criticism of their work and secondary uses of any or all parts of it—at any stage of its development” (emphasis added). Weller argues that digital scholarship is “really a shorthand for the intersection of three elements: digital, networked, and open, [although it is] really the open aspect that brings about change in the scholarly communication practice.”
THE CONCEPT OF OPENNESS IN RETROSPECT

The continuing move toward openness in scholarship is perhaps one of the most momentous transformations in current scholarly communication practices, although it is not an entirely new paradigm. The age-old question of open access to knowledge descends from several traditions of scholarship. As Weller affirms, “the story of open scholarship has been one of steady adaptation and growth rather than sudden revolution.”

This story can be traced back to Gutenberg’s invention of the printing press around 1445, which simplified the duplication of scholarly materials that had previously been done only by hand in monasteries and libraries. England’s Royal Society, established in 1662, put in place the first institutional mechanisms for promoting scientific activity, protecting the rights of authors, and governing science as public knowledge in early modern Europe. In particular, the society’s publication *Philosophical Transactions* encouraged scholars “to abandon their attachment to secrecy and to submit their work to the judgment of its fellows.” Henry Oldenburg, the society’s secretary, who established a systematic correspondence with scholars throughout Europe and provided a public forum for the announcement and discussion of new scientific discoveries, was among the first individuals to promote the idea of openness in scholarly communication.

The concept of openness in scholarship also descends from the ideas of the French Encyclopedists of the eighteenth century, who strived to disseminate existing knowledge to the public with the intention of improving society through education. The teachings of Rousseau, Montessori, and Dewey, who advocated openness as an important educational value, are also precursors of the concept of openness in scholarship.

The most recent chapter in the story of openness in scholarship—the beginning of the open access movement—can be traced back to the mid-1960s with the advent of computers that were connected through a network infrastructure. It was further expanded by the introduction of the copyleft (versus copyright) approach championed in the 1980s by Richard Stallman, the leader of the free software movement and the author of the earliest free software licenses. However, the open access movement gained momentum only in the early 2000s when three pioneering declarations, namely the Budapest Open Access Initiative (2002), the Berlin Declaration (2003), and the Bethesda Statement (2003), commonly known as the BBB declarations, transformed and shaped the open access publishing environment in successive decades by declaring that “the literature that should be freely accessible online is that which scholars give to the world without expectation of payment.”

The advent of an open access publishing model is generally attributed to three forces: (1) a steady escalation in the cost of scholarly journals, known as the “serials crisis,” which forced many academic libraries to cancel their journal subscriptions; (2) the adoption of new publishing technologies, which
expedited and simplified the ways knowledge could be disseminated to a worldwide audience; and (3) the erection of legal and technological barriers that blocked access to electronic publications by unauthorized users, or “the permission crisis,” which arose from copyright law, licensing agreements, and digital rights management. These countervailing forces—some hindering and some facilitating knowledge distribution—raised serious concern among scholars and librarians about the limitations of the traditional publishing system, in which commercial publishers hold a monopoly over the distribution of research findings. As rising scholarly journal prices, restrictive copyright and licensing terms, and access control technologies gradually excluded large parts of the research community from scholarly interaction, especially in the developing countries, a few pioneering organizations began offering alternatives to traditional subscription-based practices, launching the idea of a new publishing model that we now call “open access.”

Even though the concept of openness has had its greatest impact in the open access publishing model, it has also resulted in the emergence of other approaches to performing research “in the open,” embracing not just the end products of research that appear in journal articles and books, but the entire life cycle of research—from idea generation to publication to preservation. Nor is the concept of openness any longer restricted to scientific research; it also applies to the way of conducting research in general, communicating research results, and educating the “researchers of tomorrow.” From this perspective, openness can be viewed as part of a broader change that has made scholarly communication and educational practices more diverse and more flexible. As Peters and Roberts affirm, openness “is a concept that has come to characterize knowledge and communication systems, epistemologies, society, and politics, institutions or organizations, and individual personalities.”

THE MANY PATHS TO OPENNESS

The paths to greater openness in scholarship are many. The following are some of the most prominent models, based on open paradigms that foster the development of more equitable and transparent scholarly and educational processes.

Open Archives

Open archives enable scholars to self-archive their work by depositing digital versions of their documents (called e-prints) into online disciplinary digital archives or institutional repositories and making them openly available to scholars worldwide. For example, arXiv.org (www.arxiv.org), operated and funded by Cornell University, offers e-prints in the fields of
Open Data Repositories

Open data repositories have become a popular solution for storing and sharing open data with colleagues and the wider scholarly community. Open data, including raw data that have not yet been verified and analyzed, can be freely used, reused, repurposed, and redistributed by anyone. While some data repositories charge fees for providing advanced, value-adding options such as additional functionality and tools, many data repositories are freely and openly available online.

Open Educational Resources

The open educational resources movement seeks to make educational materials freely available to everyone through the Internet. Marshall Smith, director of the Hewlett Foundation’s Education Program, states that “at the heart of the open educational resources movement is the simple and powerful idea that the world’s knowledge is a public good and that technology in general and the World Wide Web in particular provide an extraordinary opportunity for everyone to share, use, and reuse that knowledge.”

Open Licenses

Under the traditional publishing system, most scholarly journals own the copyright on the research papers they publish. Authors traditionally assign their copyrights to the publisher, which means that authors cannot freely distribute their works or allow open access to them. Open licenses offer a more balanced approach to copyright management by allowing authors to easily communicate which rights they want to retain and which rights they want to waive for the benefit of other scholars. The two forerunners of the open access movement—the free software movement (pioneered by Richard Stallman) and the open source software movement (typically credited to Eric Raymond), often referred to collectively as FLOSS (Free/Libre Open Source Software)—created the GNU General Public License, which established a precedent for
the creation of other open licenses such as Creative Commons licenses. Creative Commons licenses (https://creativecommons.org/licenses/) are by far the most widely used kind of open licenses because they are not restricted to software codes, but can be applied to any type of scholarly or creative work in almost any medium. These licenses allow authors to reserve certain rights and modify copyright terms in order to enable others to legally use, share, and reuse their online materials in any format.

Open Access Policies

Open access policies mandating open access to publications arising from government-funded research have become crucial to the further promotion of the open exchange of scholarly information. These policies, initiated by the U.S. National Institutes of Health, which mandated a public access policy in 2008, and since then embraced by other funding agencies around the world, ensure that the public has access to the results of federally funded research. Public access to data from this research is also increasingly being required by various research funding agencies. Some scholarly journals, such as Nature, make sharing research data a requirement for publication.

Over the past few years, a growing number of universities have also been issuing open access mandates in which the faculty who sign the resolutions agree to grant their respective institutions a nonexclusive, irrevocable right to disseminate their scholarship worldwide for any noncommercial purpose. Harvard University, Trinity University, Stanford University, and Oberlin College are among the many institutions that have issued such mandates.

Open Peer Review

Some open access publishers are taking the concept of openness to the next level by introducing a new approach to article review and ranking—called open peer review. They elicit non-anonymous commentaries on their peer-reviewed articles and disclose the reviewers’ identities on the peer review reports, which may be published alongside the reviewed article. Other traits of open peer review include open interaction, in which authors and reviewers are allowed and encouraged to hold a "direct reciprocal discussion", and open pre-review manuscripts, in which manuscripts are available in advance of the formal peer review (for example, via e-print archives). Some publishers are becoming even more "open" toward the peer-review process by inviting the wider scholarly community to contribute comments and user ratings on articles they publish. For example, PLoS encourages post-publication review in the form of comments, user ratings, and discussion threads about published articles. Frontiers, another prominent open access publisher, allows readers to indirectly contribute to the ranking of a published article.
Openness and “Invisible Colleges”

Informal scholarly communication channels, often referred to as “invisible colleges,” demonstrate new possibilities for increased openness, collaboration, and transparency within the realm of scholarly communication. This concept originated in the seventeenth century in the Royal Society and served as an influential channel for information exchange, usually by the means of marginalia, among scholars who did not belong to any formal institution. Today, these channels include blogs, wikis, discussion forums, and academic hubs that have become highly regarded as important sources of information for researchers. These channels enable researchers to connect with each other, discover new ideas, and discuss research findings. Such informal communication practices encourage experimentation and innovation in a way that may be less likely to occur if they were included as formal metrics of scholarly impact for individual career advancement.

Openness across Disciplinary and Societal Boundaries

The emergent field of transdisciplinarity is another, more open way of looking at the relationship between knowledge production and society. It has arisen in response to the need for a more democratic governance of knowledge production that is focused on joint problem-solving and joint decision-making. In a nutshell, transdisciplinarity is a new way of conducting research, in which multiple contributors and stakeholders, both within and outside academia, work together to identify urgent, complex problems of the real world and craft solutions to those problems. Examples of such “real world” problems that have intensified in recent decades include climate change, unsustainability, violence, and risks to human health resulting from new technologies, among others. Some scholars argue that “real world” problems themselves are transdisciplinary in nature and that contemporary science, which is still largely composed of individual academic disciplines, can neither properly understand nor cope with these problems.

Transdisciplinarity transcends and integrates diverse perspectives and perceptions through the collaboration of multiple researchers from different disciplinary fields and through the active participation of multiple stakeholders such as policy-makers, educators, and practitioners who aim to translate research findings into specific actions to address the problem under investigation. Transdisciplinarity also involves the subjects of research (i.e., people from the real world) as active participants throughout the research process so that the research is being carried out with them rather than on them. By bringing together academic and nonacademic knowledge and know-how from diverse sources, transdisciplinarity opens up not only disciplinary boundaries but also the boundaries between science and society, and thus generates
knowledge that is more socially valuable than that produced by any single discipline or combination of disciplines.\textsuperscript{30}

\section*{BARRIERS TO OPENNESS IN SCHOLARSHIP}

Like any transformative concept, the concept of openness in scholarship faces both external and internal barriers to its adoption and implementation. Even though openness is becoming increasingly recognized as a valuable approach to knowledge production and distribution, it has been only slowly accepted in academia. This state of affairs is partially due to the fact that publication in traditional peer-reviewed journals, especially in journals with high-impact factors, is still one of the most important criteria for tenure, compensation, and promotion.\textsuperscript{31} In some institutions, scholars work in contexts where open scholarship is “not only not recognized, but actively discouraged.”\textsuperscript{32}

Digital technologies themselves impose some constraints on the greater use of open access resources. These constraints include inadequate or unreliable Internet connections, filtering and censorship restrictions on accessing certain web-based materials, language barriers for non-English speakers, and inadequate access for users with disabilities.\textsuperscript{33}

However, for some scholars, the complete transition to open access is “less a battle with [the] external forces usurping practice, but more an internal one, between existing practice and [the] opportunities available.”\textsuperscript{34} Internal barriers to openness include psychological “threats” such as information overload due to the increasing availability of open access publications from a diverse range of sources,\textsuperscript{35} and the time and effort it takes “to make the cognitive leaps required for openness to a different mode of thought or a new body of knowledge.”\textsuperscript{36} Also, the pressure on scholars to make claims to priority of discovery or invention can lead to temporary secrecy about ongoing research, especially in rapidly developing biomedical and engineering fields where recognition and tenure often depend on who is the first to publish a new research finding, and where there is fear of the ideas being “borrowed” by a competitor.\textsuperscript{37}

Finally, the lack of clear understanding of the nature of open access that still exists in academia hinders the complete transition to open access in scholarly publishing. Suber argues that the open access movement is still being held back by “persistent and harmful myths and misunderstandings” about open access, namely, that open access bypasses peer review, invites plagiarism and misattribution, and violates copyright, among other things.\textsuperscript{38} Even though the proponents of open access consider the traditional commercial publishing system to be obsolete and believe that the future of scholarly publishing belongs to open access, more skeptical researchers are concerned about the risks posed by open practices and by what “unfettered openness” could mean for the future of scholarship.
CONCERNS ABOUT OPENNESS IN SCHOLARSHIP

While openness in scholarship provides solutions to some substantial issues facing publishing, research, and education, it is also opening the door to new concerns. Like any emerging process, open access inadvertently generates opportunities for unethical practices such as predatory publishing. This practice exploits the open access “author-pays” business model for private gain by promising a quick publishing venue to researchers without ensuring proper quality control of published research. By doing this, predatory publishing threatens the integrity of scholarly communication and corrupts the ideal of openness in scholarship, not to mention the fact that it results in a colossal loss of knowledge. “Unfettered openness” also allows for the proliferation of inadequately researched, plagiarized, self-plagiarized, or “poorly written exercises in career maintenance and advancement.” It also creates the potential to easily copy and distribute vast amounts of copyrighted materials.

Recognition of the issues associated with openness in scholarship has led researchers to believe that “openness should have some limits, especially in the scholarly world.” These limits are necessary for at least two reasons: to ensure the integrity of scholarly communication, and to ensure intellectual coherence and focus at the level of the individual scholar. How to best enforce such limits without impeding the move toward greater openness in scholarship is still being explored.

Other issues arise when the culture of openness clashes with traditional scholarly practices; for example, when researchers feel pressured to adopt open behaviors in a networked environment they might not yet be comfortable with. Some researchers also believe that having an open presence on the Web, for example, via social media sites, contradicts their scholarly values and negatively impacts their professional image.

Digital technologies, while undoubtedly among the most powerful driving forces enabling openness in scholarship, also raise a number of non-technological issues such as the “participation gap,” which refers to unequal access to technology or the lack of essential digital literacies. In The World Is Flat: A Brief History of the Twenty-First Century, Thomas Friedman argues that even though digital technologies have helped create a level playing field between nations, groups, and individuals, there is no guarantee that these technologies will be used for the benefit of humanity because the disempowered live in the “flat world,” and “don’t have the tools or the skills or the infrastructure to participate in any meaningful or sustained way.”

CONCLUSION

It is clear that the open access movement is gathering momentum. It is just as clear that its “long-term success is a long-term project.” As Boyle emphasized,
“it is not that openness is always right. It is not . . . . Rather, it is that we need a balance between open and closed, owned and free, and we are systematically likely to get the balance wrong.” While much of the discussion around “openness” in scholarship has been about how to lower or eliminate the cost and permission barriers to research, questions still remain concerning the concept of openness itself, which is still a vaguely defined area. Further discussion is needed to bring clarity to this concept, test assumptions concerning openness, and provide guidance to others.

Academic and research libraries are in a strong position to support the open access movement. Their motivation for supporting this movement can be attributed to at least three reasons: (1) a close alignment between traditional library values of free and equal access to knowledge and the values of the open access movement; (2) the potential to reduce serials management expenses that are due to the escalating costs of journal subscriptions; and (3) an opportunity to demonstrate libraries’ continuing relevance and effectiveness in the increasingly open web-based research environment. For example, libraries can manifest their support through the creation of institutional repositories that help ensure researchers’ compliance with public access policies, and through the establishment of open access publishing funds that help cover article processing charges on behalf of affiliated authors.

Libraries are also in an ideal position to educate researchers about the risks associated with openness in scholarship, such as predatory publishing and other unethical scholarly practices that threaten the integrity of published research due to the lack of proper quality control. Librarians’ knowledge of publishing trends and copyright law can further contribute to the success of open scholarship by keeping researchers well informed about publishing alternatives such as publishing in open or hybrid journals and about their rights as authors.

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Index

A
academic freedom, 22
academic libraries, OA and, 25–29
Academy of American Poets, 160
Action Plan on Open Government (Canada), 20
Adamick, Jessica, 249
Addiction Data Commons, 238
additive manufacturing, 126
adjuncts, 147–48
advertising, 84–85
advocacy, suggestions for, 102
Affordable Learning Georgia (ALG), 158
Affordable Learning Louisiana, 200
Affordable Learning Ohio, 200
Africanfossils.org, 128–29
All of Us Research Program, 247
Andersen, Hans Christian, 57
Anderson, Rick, 26
Archambault, Eric, 23
article processing charges (APCs), 23, 24–25, 60, 86–87, 93–106
ArXiv, 9–10, 86, 211
Asia, 41–55
Asia Catalyst, 49, 53
Asian Pacific Institute on Gender-Based Violence (API-GVB), 49, 53
Asian Women’s Shelter (AWS), 49, 54
Association of Research Libraries (ARL), 97
Athabasca University, 29
Athabasca University Press, 28
Australian National Data Service, 229
Author Addendum, 6
Authoring Tools and An Educational Object Economy, 197
authors
OA and, 22–23
openness as right of, 6
authors’ rights movement, 6
Awards to Scholarly Publications Program (ASPP), 28–29

B
Baker, Crystal A., 162, 166
Baum, Sandy, 198
Bay Path University, 144–46, 147–50, 152
BBB declarations, 8
B.C. Open Textbook Project, 29
Beall, Jeffrey, 96
Berkman Klein Center for Internet and Society, 70
Berlin Declaration (2003), 8, 128
Bethesda Statement (2003), 8
Bhungroo irrigation technology project, 45, 50
Big 10 Academic Alliance, 6
Big Data to Knowledge (BD2K) initiative, 246
big deal packages, 26–27
Bill & Melinda Gates Foundation, 62, 214
bioprinting, 130
Björk, Bo-Christer, 96
black feminist thought, 58–59
black women, 58–59, 60–61, 63–64
born-digital advertising, 85
Bowyer, Adrian, 126–27
Boyle, James, 14–15
Bradstreet, Anne, 164, 165
Bramlet, Matthew, 251
Brennan, Patricia Flatley, 246–47
Brigham Young University (BYU), 199
British Medical Journal, 84
“broader impact” statements, 5
Brønnick, Kolbjørn, 162, 166
Brown, Patrick, 3
Budapest Open Access Initiative (2002), 8, 19, 31, 212
Bureau de Cooperation Interuniversitaire, 25
Burton, Gideon, 7

C
California State University Center for Distributed Learning (CSU-CDL), 197
Canada
academic libraries in, 25–29
community-driven consortium initiatives in, 29–30
federal funding agencies in, 21–22
government of, 20–21
open access movement in, 19–40
publishers in, 24–25
researchers and research institutions in, 22–23
success stories from, 24
Canadian Association of Research Libraries (CARL), 19–20, 25, 27, 28, 29–30
Canadian Copyright Act, 21
Canadian Federation for the Humanities and Social Sciences, 26, 28–29
Canadian Federation of Library Associations (CFLA), 26
Canadian Institutes of Health Research (CIHR), 21–22
Canadian Library Association, 26
Canadian Research Knowledge Network (CRKN), 25, 26, 27
Canadian Scholarly Publishing Working Group, 29
“Canadian Universities and Sustainable Publishing” (Whitehead and Owen), 19–20, 31
CARL Open Access Working Group’s Library Open Access Funds subcommittee, 27
Carmena, Jose, 3
Carroll, Alexander J., 158, 161, 163, 164, 166
Center for Digital Scholarship, 231
Center for Open Science, 215
Chan, Jessica R. M., 134
Charter of Transdisciplinarity, 5
climate change, 41–55
climate change adaptation (CCA) techniques, 41, 47, 50–51
ClinicalTrials.gov, 247
Coalition of Open Access Policy Institutions (COAPI), 74, 238
Coalition Publi.ca, 29
Coates, Heather, 231
educational resources, open. See open educational resources (OERs)
Eisen, Michael, 3

E
Electronic Freedom of Information Act Amendments (1996), 5
electronic patient health information (ePHI), 228, 233
Enmil, Sandra Aya, 134
Environmental Protection Agency, 220, 251
e-prints, 9–10
equitable access, 61
Érudit, 25
Eshe-Alkalai, Yoram, 162
ethical obligation, openness as, 5
ethics and open data, 217
eyestrain, 166–67

F
F1000 Research Ltd., 24
Facets, 25
faculty
buy-in from, 149–53
research data and, 214–16
textbook adoption and, 171–93
Family Educational Rights and Privacy Act (FERPA), 227
"Five Safes," 229
5Rs, 6, 197
Florida Virtual Campus Textbook Survey, 157, 199
FLOSS (Free/Libre Open Source Software), 10
Foster, Erin, 231
Fox, P., 254
Frantsvåg, Jan Erik, 85
free software movement, 6, 8, 10
Freedom of Information Act (1966), 5
freedom of inquiry, openness as, 5
Freire, Paulo, 65
French Encyclopedists, 8
Friedman, Thomas, 14
Frontiers, 11
funding models, 81–91, 146
funds for OA, 27
fused deposition modeling (FDM), 126, 128
fused filament fabrication, 127

G
Gates, Bill, 62
Gates Foundation, Bill & Melinda, 62, 214
gender equality/equity, 44–46, 47
Genetics Home Reference (GHR), 247
geographic information system (GIS) data, 251–52
Geri, Nitzia, 162
Global Goods Partners, 49, 54
GNU General Public License, 10–11, 127, 134–35
Gold Open Access, 21, 23, 24, 27, 59, 60, 61, 94, 95–96, 98
Golden State Killer, 217
Goodman, Amanda, 128
government data, 213–14
grants for OER adoption, 150–51
Green Open Access, 21, 27, 59–60, 83, 96, 119
Gregory, Cynthia, 162
Griffey, Jason, 130
Groenendyk, Michael, 130
"Guerilla Open Access," 212
Gutenberg, 8

H
Hackman, Timothy, 158
Handle, 218–19
Hanss, Ted, 144
Harnad, Stevan, 70
Harrell Library, 249
Hatch Library, 144–45, 153
Health Insurance Portability and Accountability Act (HIPAA), 227, 228, 230, 233, 235, 238, 248
health sciences libraries, 245–60
Helen Keller International, 49, 54
Hendler, J., 254
Henry Luce Foundation, 49, 54
Hernon, Peter, 159, 163, 167
Hesse, B. W., 44
Hewlett Foundation, 146
HHS Ventures Fund, 251
HITECH Act, 238
HIVOS, 49, 54
Horizon 2020, 213
Hornick, J., 135
Hull, Charles, 126, 137
Human Genome Project, 247
Human Rights Watch—Asia, 49, 54
human subjects research, 227–28
Hungry Project, 49, 54
hybrid open access, 96
hybrid subscriptions, 85
Hyde Park Debate, 99

Indiana University Purdue University
Indianapolis (IUPUI), 226, 229–39
information flows, 42–45
information overload, 13
informed consent statements, 228
intellectual property rights, OER and, 151.
See also copyright
International Federation of Library
Associations, 46, 48
International Rescue Committee, 49, 54
intersectionality, 57–67
Interuniversity Consortium of Political
and Social Research and, 232
invisible colleges, 12, 42
Islandora, 28
IUPUI DataWorks, 231–32

Jain, Trupti, 45
James, Henry, 160
Jenkins, Amy, 162
Johnston, David J., 69
Jones, Barbara, 132
journal subscriptions, business model
for, 24
Journal Usage Project, 27
Journal/Author Name Estimator (Jane),
254

Keck, Margaret E., 46
Kern, B., 69
Khunchornyakon, Wandee, 45
Kickstarter, 86
Kimmons, Royce, 7
Kleinman, Molly, 144
Kleymeer, Pieter, 144
Knowledge Unlatched (KU) initiative, 26
Kohl-Davis perception study, 82
Kopernik, 45
Kuk, George, 129
Kurose, Charles, 198
Kyoto Protocol (1997), 43

Larivièrè, Vincent, 27
library consortia, 200
Library of Congress, 46
“Library Open Access Funds in
Canada,” 27
library science journals, 81–91
literary studies, OERs in, 157–70
LOUIS, 200, 204
Luger, Richard, 230

Mackie-Mason, Jeffrey, 24
Macko, Marek, 130, 131
MAI: Feminism and Visual Culture, 86
Majka, Piotr, 130
Makerbot, 127, 129, 131, 135, 136–37
“Making Open and Machine Readable
the New Default for Government
Information” (Obama), 213
Mamtora, Jayshree, 48
mandatory policies, 70
Mangen, Anne, 162, 166
marginalia, 12
marginalized populations, 58, 64
Massachusetts Institute of Technology
(MIT), 197–98
Maxwell, Robert, 94
Mayer, Adam, 127
McGinty, Stephen, 249
McLeod, Kembrew, 133
McPherson, Michael, 198
Medical Library Association, 245
Medical Subject Headings (MeSH), 253
Medline, 254
memberships funding model, 86
“Memorandum on Transparency and Open Government” (Obama), 213
Merton, Robert, 4–5
metadata
data catalog project and, 236
schemas for, 218
standards for, 229
mindset, openness as, 5
MOBIUS, 200
Momentum for Change program, 44, 47, 49, 55
Montessori, Maria, 8
Montreal Neurological Institute and Hospital (MNI), 24
Morozov, Evgeny, 4
MorphoSource, 128–29
Morrison, Heather, 97
Moser, R. P., 44
Multimedia Educational Resource for Learning and Online Teaching (MERLOT), 197

N
Naireeta Services, 45
Narrative of the Captivity and the Restoration of Mrs. Mary Rowlandson, The, 164, 165
NASA 3D Resources, 128–29
National Aeronautics and Space Administration (NASA), 229
National Center for Biotechnology Information (NCBI), 228
National Institutes of Health (NIH), 213, 226, 246–47
National Library of Medicine (NLM), 246–47, 251
National Oceanographic and Atmospheric Administration, 226
National Science Foundation (NSF), 43, 213, 226, 246
Natural Sciences and Engineering Research Council of Canada (NSERC), 21–22
Netherlands Bioinformatics Center, 254
New York University Health Sciences Library (NYUHSL), 250
NGOs, in Asia, 47–49
Nicollelis, Miguel, 3
NIH 3D Print Exchange, 128, 250–51
Nisonger, Thomas E., 82
Nowlan, Gillian Andrea, 129
NYC Resistor, 127

O
O Pioneers! 165
Obama, Barack, 213, 220, 251
OER Adoption Pyramid, 173, 174–75, 178
OER Task Force, 195–96, 202–3, 204, 205–6
OhioLINK, 200
Oldenburg, Henry, 8
Ontario Council of University Libraries (OCUL), 25–26
open access funds, 98–101
“Open Access Funds in Action” (SPARC), 97
open access movement
beginning of, 8
in Canada, 19–40
open access policies, 11, 62, 69–77
open access publishing. See also article processing charges (APCs)
basics of, 59–60
beginning of, 8–9
costs associated with, 7
data on, 97–99
infrastructure for, 27–28
philosophy of, 3–4
Open Access (Suber), 95
Open Anthology of Earlier American Literature, 159
open archives, 9–10
Open Archives Initiative, 218
open data
data-sharing landscape and, 226–27
health sciences libraries and, 245–60
open science and, 211–24
Open Data Exchange, 20
Open Data Handbook, 212
open data, library support for, 29–30
Open Data portal, 20
open data repositories, 10
Open Education Week, 204
open educational resources (OERs)
in Canada, 29

alastore.ala.org
challenges involving, 146–53
consortiums and, 195–208
description of, 10
5Rs and, 6
introduction to, 143–55
in literary studies, 157–70
textbook adoption and, 171–93
Open Government Partnership, 20
Open Illinois Initiative, 195–208
Open Journal Systems (OJS), 25, 28
Open Knowledge Foundation, 6
open licenses, 10–11
Open Monograph Systems, 25
open monographs, support for, 26, 28–29
open peer review, 11
Open Repositories Working Group, 28
open science, 211–24
Open Science and Citizen Engagement initiatives, 20
Open Science Monitor report, 23
open source software movement, 10
Open Textbook Library, 158
Open Textbook Network (OTN), 195, 196, 200, 201–2, 203–4, 205
OpenAIRE initiative, 28
OpenCourseWare initiative, 28
openness
barriers to, 13
challenge of defining, 4–7
concept of, 3–18
concept of in retrospect, 8–9
concerns about, 14
paths to, 9–13
OpenStax, 158
opt-in policies, 70
opt-out policies, 70
O'Reilly, Michael K., 130
Owen, Brian, 19–20, 31
OXFAM International, 49, 54
Pennsylvania Libraries: Research & Practice, 86
permission crisis, 9
Peters, Michael A., 9
Pettis, Bre, 127, 136–37
Philosophical Transactions, 8
PLoS Biology, 3
policy-making, 69–77
political entrepreneurs, 46–47
Pooley, Jefferson, 129
Portage Network, 29–30
precision medicine, 247
predatory publishing, 14
print textbooks, preference for, 158–59, 161–63, 167
printing press, invention of, 8
Project Gutenberg, 160
Project Kaleidoscope, 200
protected data, 225–44
Protocol for Metadata Harvesting, 218
Pryor, Steven, 130–31
Public Domain Dedication license, 134
Public Knowledge Project (PKP), 25, 27–28
Public Library of Science (PLoS), 3, 11
publishers, OA and, 24–25
PubMed Central, 245–47, 254
Q
Qatar Computing Research Institute, 253
R
rapid prototyping, 126
Raymond, Eric, 10
Rayyan, 253–54
re3data.org, 248
reading speed, electronic texts and, 162–63
Regazzi, John J., 7
Registry of Open Access Repository Mandates and Policies (ROARMAP), 70
Registry of Research Data Repositories (r3data), 218
repositories
evolution of, 109–24
open access 3D, 125–39

P
Pan-Pacific and Southeast Asia Women's Association of the United States, 49, 55
Paris Agreement (2015), 43
participation gap, 14
Pell Grants, 198

alastore.ala.org
RepRap Project, 126–27, 134–35
research data life cycle, 248
research data management (RDM) services, 248–50
researchers, open data and, 214–16
“Responding to Unsustainable Journal Costs” (Shearer), 27
Reznik-Zellen, Rebecca, 249
Riley, W. T., 44
Roberts, Peter, 9
Roland, D., 135
Rousseau, Jean-Jacques, 8
Royal Society, 8, 12

S
Sackstein, Suzanne, 162
Salt Lake Community College, 200
Schimmer, 25
scholarly communication business models, 94–96
Scholarly Publishing and Academic Resources Coalition (SPARC), 6, 74, 84, 97
Scholars Portal (SP), 25–26
scientific norm, openness as, 4–5
Scott, Alison, 99–100
self-archiving works
description of, 9–10
Green Open Access and, 59–60
overview of, 96
right to, 6
serials crisis, 8
Shearer, Kathleen, 27
Sikkink, Kathryn, 46
silos, 148–49
Smith, Marshall, 10
Smith, Zachary “Hoeken,” 127
social activism, 43
social justice, OERs and, 152
Social Sciences and Humanities Research Council of Canada (SSHRC), 21–22
societal boundaries, openness across, 12–13
Software as a Service (SaaS), 215
Software Preservation Network (SPN), 219
Solar Power Company Group, 45
Solomon, David, 96
Sonny Bono Copyright Term Extension Act of (1998), 133
SPARC (Scholarly Publishing and Academic Resources Coalition), 6, 74, 84, 97
Spark, Linda, 162
Stallman, Richard, 6, 8, 10, 134
Standard Tessellation Language (.STL), 126
stereolithography, 126
Stony Brook University, 71
Stratasys, 126
strong policies, 70
student loan debt, 198–99
Suber, Peter, 13, 69, 95
subscription-based publishing, 95
SUNY campuses, 71–73
Sustainable Development Goals, 46
Swartz, Aaron, 212
Synergos, 49, 55
systematic reviews, 252–54

T
Tananbaum, Greg, 99
technological advance, openness as, 7
Tenopir, Carol, 214–15
Textbook Transformation Grants, 158, 200
textbooks
costs of, 157–58, 198, 199
open, 29, 171–93
Thingiverse, 127, 129, 131, 135, 136
Thing-o-Matic, 127
3D printing, 125–39, 250–51
3dBARS, 130
toll-access publishing, 95
Torrone, Phillip, 127
Touro College School of Health Sciences, 131, 135
TOXMAP, 251–52
transdisciplinarity, 12–13
transnational advocacy networks (TANs)
climate change in Asia and, 44–45
introduction to, 41–42
open scholarship and, 45–51
transparency, openness as, 4
Transparency and Openness Promotion (TOP) guidelines, 215, 226–27
Tri-Agency, 21–22
Trotter, Henry, 173, 175, 178
Trump administration, 220
Turner, W. C, 43
23andMe, 217

U
Ultimaker, 127, 129
UN Women, 49, 55
UNESCO’s Paris Declaration, 196–97
“unfettered openness,” 13–14
United Kingdom Data Service, 229
United Nations Development Program (UNDP) in Asia and the Pacific, 49, 55
United Nations Framework Convention on Climate Change (UNFCCC), 43, 44–45, 49, 55
University Center for Advanced Cybersecurity Research, 235
University of Calgary Press, 28
University of Ottawa Press, 28
University of Virginia Hypertext Library, 160
“unsupervised copying” exception, 134
U.S. National Institutes of Health, 11
USA Science and Engineering Festival, 250–51
user’s right, openness as, 6–7

V
Varmus, Harold, 3
Veletsianos, George, 7
VIVA, 200, 202
voluntary policies, 70

W
Wakaruk, Amanda, 20–21
Walgermo, Bente R., 162, 166
weak policies, 70
Web of Science enclave, 238
Wellcome Trust, 62, 214
Weller, Martin, 7, 8
Wesolek, Andrew, 70
West, Joel, 129
Wheatley, Phillis, 164, 165
White House Maker Faire, 251
Whitehead, Martha, 19–20, 31
Wiley, David, 6
Willinsky, John, 28, 30
Wishnetsky, S., 69
WOCAN, 49, 55
women’s rights, 44–46
Woody, William Douglas, 162, 166
World Is Flat, The (Friedman), 14
World Open Educational Resources Congress, 196–97
Writing the Nation: A Concise Introduction to American Literature 1865 to Present, 160–61, 164

Y
YouMagine, 129

Z
Zou, Jinwang, 158