

Open Access: The Key Driver to Address the Grand Challenges

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Abstract

Open Science plays an essential role to tackle the grand challenges that we face today. Open Access to scientific output has tremendously increased the R&D process during the COVID-19 pandemic, where we have witnessed the fastest development of a vaccine against any health menace in the history of the world. The main theme of this year is, International Open Access Week: Open for Climate Justice, which aims to stimulate cooperation and collaboration in the climate change research community so that the consequences of the looming climate crisis can be prevented before it is too late. In this paper, I summarize the recent developments in the Open Access domain and underline the current issues that the Library and Information Science (LIS) community is facing nowadays. More specifically, I will address the issue of transformative agreements and point out some of the open questions such as the widening equity gap regarding access to scientific information across the globe.

The main theme of the International Open Access Week this year is Open for Climate Justice. Last year's theme was also related to justice, which was, It Matters How We Open Knowledge: Building Structural Equity. Justice, equity and equality have drawn attention in recent years in terms of gaining access to knowledge. The equity of access to COVID-19 vaccination is also a major issue. More than two thirds of the population of high-income countries have been fully vaccinated thus far, whereas less than 5% of low-income countries have been vaccinated. Similarly, there is a rift of climate justice (or rather injustice) between rich and poor, women and men, and older and younger people.

Openness can help reduce this gap considerably. I am going to discuss how open access and open science can help tackle the grand challenges such as COVID-19 and climate crisis. More specifically, I am going to go over how open access accelerated the process of developing vaccines against the COVID-19 pandemic and finding a cure to thereto.

The publisher Oxford University Press chose the word “vax” as the word of the year for 2021. It was an “unprecedented year” in which scientists developed vaccines (yes, more than one vaccine!) for an infectious disease in less than a year for the first time in history. Thanks to publishers' opening up their COVID-19 related papers and the data on the use of all scientists, it took less than a year to develop the vaccine. Over 90% of all COVID-related papers were accessible. This was unprecedented because open access rates for papers on other diseases were much lower, which prolonged the process of finding a cure for those diseases.

Immediate and full sharing of new scientific evidence could play a decisive role in contrasting outbreaks of infectious diseases (Centers for Disease Control and Prevention, 2003; King et al., 2012). The case in point is the vaccine against the Ebola virus, as “...the Ebola virus outbreak in Liberia in 1982 remained hidden to some public health institutions because the paper reporting this information was published in a subscription-only journal (Knobloch et al., 1982). A timelier dissemination of this study would likely have led to faster and more

effective actions to reduce the scale of the epidemics that occurred later in 2014 (Smith et al., 2017). This brings us to the fact that scientific knowledge should be considered a “commons”. Elinor Ostrom, who was the first Nobel prize winning woman economist, did pioneering work on how to manage the “commons”. Up until Ostrom’s work, commons such as pastures, water resources, fishing rights, etc., can easily be exhausted because everybody wants to benefit most from common resources. She showed that this was not the case and that commons can be governed effectively as well. She later wrote a book on knowledge as commons.

Ostrom defined knowledge as commons according to whether its value is diminished when used (subtractability) and whether its use can be restricted to a certain person or a group (excludability). For example, my benefiting from useful knowledge (i.e., learning Kazakh language) will not diminish the value of somebody else’s learning Kazakh language. Ostrom classified resources based on these two axes. For instance, foreign language learning is low in subtractability, and it is difficult to exclude other from learning foreign languages.

Contrary to physical resources, my using a digital resource will not diminish its value for others. However, it is easy to exclude others because of the licensing mechanisms that are in place today. This must be changed if we wish to accelerate the process of finding vaccines against infectious diseases or find solutions to grand challenges such as climate crises. Louis Pasteur was the first to acknowledge the crucial importance of knowledge as being a “commons”, although he didn’t use the word “commons”, which is open to everyone. He said, “The reason why science is not open to everyone is because scientific output such as papers, data, etc., became a lucrative industry, especially within the last 30 years.”

Scientific publishers make more than 25 billion dollars annually off of scientific papers, which they neither funded nor paid for the salaries of researchers who carry out research or for the quality usually done by the very same researchers free of charge. However, they put these publications behind the paywalls or impose embargoes, which prevent the very same researchers from accessing them. This slows down the whole scientific process. If you are further interested in this topic, please take a look at the documentary film called “Paywall: The Business of Scholarship”, readily available at paywallthemovie.com.

Several studies have shown that the existing intellectual property rights are detrimental to the process of scientific developments and innovations. Due, in large part, to existing intellectual property rights, we are in what is called a vicious circle. Many scientists and institutions cannot afford to provide all scientific resources because of their high licensing costs. This is called the affordability crisis.

The publishing industry is also slow to incorporate digital developments. For instance, the publishing process can be accelerated by opening up the reviewing process (e.g., open reviewing or post print reviewing), data and reuse. This is called a functionality crisis. Moreover, paywalled access also created what is called a replication crisis, as it is difficult to replicate the findings when the publications, data, and methods are not open to everyone. As it was noted:

“Recently, an intense debate has arisen about the feasibility of increasing access to scientific literature through transformative agreements; contracts negotiated between publishers and institutions that combine subscription access to journals with the possibility of open access publishing, shifting costs from authors to institutions.” (Borrego et al., 2021; Farley et al., 2021)

“It is worth noting that the green road has three fundamental advantages over the transformative agreements: first, it does not risk increasing the costs that should be paid by institutions to publishers, which is a concern for countries with limited financial research support (European Research Council, 2020); second, it does not suffer from the uncertainties and latency of negotiation processes; third, the green road poses no equity problem, whereas transformative agreements can be more or less advantageous, depending on the negotiating strength of institutions or their consortia with the publishers.”

Getting back to the role of open access helping tackle grand challenges, in 2019, two years before “vax” was selected as the word of the year by the OUP, the word of the year was “climate emergency”. According to the World Economic Forum’s Global Risks Report of 2022, people identify climate-related issues and biodiversity losses due to climate crises as the most severe risks over the next 10 years. In fact, they see the climate crisis as the most severe risk in the next zero to two years and two to five years. However, we did almost nothing within the last three years to confront the climate emergency problem.

Climate emergency is one of the “wicked problems”. Wicked problems are those challenges that are complex to define, let alone to solve. I am aware of the economic and political pressures regarding reducing temperatures. I am aware of the “right” to pollute air and its trading over the years, i.e., less polluting countries selling their polluting rights to more polluting ones. However, despite the existing inequities in obtaining access to the vaccine, if we were able to find a vaccine against the COVID-19 virus in less than a year, we can also take immediate measures against the looming climate crisis.

I think one of the things we can do relatively easily is to embrace the need for radical change. We can embrace open science consisting of open access, open data, open source software, open infrastructure, open reviewing, open licensing, etc., before it is too late.