Equity in Public Access to Scientific Research Results: Insights from Federal Agency Responses to the Nelson Memorandum Policy

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Abstract

To empower progress in society, it is vital to ensure that scientific research results are transparent and freely available to everyone. Public Access is intended to solve issues that constrained scholarly communication and research advancement, namely accessibility, affordability, and equity. Yet, there is little agreement among funding and research agencies, policymakers, repository managers, and data producers about what equity means in public access to research results. This study offers insights into the meaning of equity in public access based on an empirical analysis of how federal agencies, as a key set of stakeholders, are responding to the requirement for equity in the 2022 White House Office of Science and Technology Policy Memorandum on "Ensuring Free, Immediate, and Equitable Access to Federally Funded Research". The conclusion indicates little consensus on the concept of equity in public access to research results and a wide-ranging set of factors related to equity.

Keywords: Equity, Federal agency, Nelson Memorandum, Public Access, Research results.

1. Introduction

To empower progress in society, it is vital to ensure that scientific research results are made transparent and freely available to everyone. Public access is intended to solve three issues that have long constrained scholarly communication and research advancement, namely accessibility, affordability, and equity (Velterop, 2003; Matheka et al., 2014). A better understanding of equity in public access to research results is believed to accelerate discovery, promote collaboration, foster public trust and innovation, and provide opportunities for all to participate in research. Yet, there is little agreement among funding and research agencies, policymakers, repository managers, and data producers about what equity means in relation to public access to scientific research results (Albornoz et al., 2018; Burgelman et al., 2019; Ross-Hellauer et al., 2022).

This study focuses on federally funded research in the United States, but issues around public access and equitable government-supported scientific research results are increasingly relevant across the globe. Public sector data curation initiatives such as the European Commission's Horizon 2020 Framework ("Horizon 2020 – European Commission", 2016), Canada's Action Plan on Open Government 2014–2016 (Treasury Board of Canada Secretariat, 2014), and the new data policies of UK government research funding councils ("Funders' data policies Digital Curation Centre", 2016) all contain directives to researchers in their constituent countries concerning legal mandates and best practices for management and curation of research data (Carleton and Porter, 2018).

Each aspect of the 2022 White House Office of Science and Technology Policy Memorandum on "Ensuring Free, Immediate, and Equitable Access to Federally Funded Research" (Nelson, 2022) has generated considerable debate and interpretation in relevant circles. Yet, one concept in the new guidance has received the least consideration in all this discourse, perhaps because it is the most open-ended. This is the additional stipulation of *equity*. Therefore, this study aims to contribute to the understanding of how federally funded research results can be equitably accessible to the public by offering insights on the meaning of equity in relation to public access to research results, based on an empirical analysis of how federal agencies in their public access plans are responding to the requirement for equity in the Nelson Memo.

In order to create a better understanding of the meaning of equity in relation to public access, we conducted a qualitative content analysis of federal agencies' public access plans. Of 22 agencies, 13 had published draft plans by May 2024 (Science.gov, 2024). The chosen public access plans include plans and documentation from the agencies listed in Table 1 in Section 3. Method. This study examines the available

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plans, sometimes expressed as drafts or guidance, from these federal agencies to understand how they define and operationalize the concept of *equity* in relation to access to scientific research results. In particular, we sought to understand how agencies' responses to the Nelson Memo characterize *equity* as a concept distinct from *public access or public accessibility*.

2. Background and prior work

2.1. The Nelson Memorandum

The Nelson Memorandum policy guidance has generated considerable impact on federal agencies, libraries, research repositories, academic publishers, and academic institutions and researchers more broadly. The new guidance comes nearly ten years after the 2013 Memo (Holdren, 2013), which dramatically amplified momentum toward open science, including widespread institutional and infrastructural investments in research data access and preservation, a skilled and growing data curation workforce, and training and guidance on best practices and principles for making data accessible. This research builds on prior work analyzing federal agency responses to the 2013 Holdren memo, which found that agencies with a long history of supporting scientific research were best prepared to implement new public access policies, that most agencies did not include implementation details in their initial guidance, and that further research is necessary to understand how federal policy shapes public access (Kriesberg et al., 2017). The implications of the Nelson Memo are significant, as the guidance adds requirements for immediate, free, and equitable access to the prior, more open-ended requirement that agencies increase open access to federally funded research. These additional expectations have demanded new interpretations, revised funding models, new workflows, and new institutional and agency policies and processes at every level.

2.2. Theories of Equity

The literature review covers broader conceptual approaches to equity and then narrows its focus to understanding the growing body of work on the implications of equity for open science and public access, including the global disparities in access to and capacity for the reuse of scientific data and research (Bezuidenhout et al., 2017).

How should one conceive of equity? Equity is an ethical concept, grounded in principles of distributive justice. It is related to "fairness" or "justice". Such formulations bring to mind a succession of questions. What is fair? What claims should be recognized? In what ways are people to be conceived of as being equal, and how is equal treatment to be measured? Should the treatment of unequal perpetuate or reduce inequality? (Braveman and Gruskin, 2003; Lucy, 1981; Svara and Brunet, 2020). Equity is a complex notion that can easily be misinterpreted (Lucy et al., 1977; Young, 1995). The concepts of equity and justice have changed remarkably over history, and as the intolerance of stratification and differentiation has grown, the very concept of inequality has gone through radical transformation (Lievrouw and Farb, 2003). The OED defines equity as: *"the quality of being equal or fair; fairness, impartiality."* (\and Farb, 2003). To understand what equity means we must look at what contextual situation it is used in (Lucy et al., 1977; Young, 1995). Since people or groups may not have the same opportunities, equity is understood to mean they should be provisioned differently to address the disparities in opportunity (Carleton and Porter, 2018). Concern for equity certainly extends to all who are economically disadvantaged and not just those who belong to particular social groups, although there should be recognition that economic disadvantage is not randomly distributed across social groups (Svara and Brunet, 2020). Equity is also a central concern in the most basic political decisions i.e. distribution of the tax burden (Young, 1995). Social equity pertains to ensuring fairness and justice, in the development and delivery of government policies and services (Svara and Brunet, 2020; Frederickson, 2015; Gooden, 2015; Guy and McCandless, 2012; Riccucci, 2009). *"Social equity is the active commitment to fairness, justice, and equality in the formulation of public policy, distribution of public services, implementation of public policy, and management of all institutions serving the public directly or by contract"* (Svara and Brunet, 2020, p. 352). The discrepancy between rural earnings lies in the sources of income. Urban residents typically earn salaries while rural workers mainly derive their income from agriculture (Cao and Akita, 2008; Fadhil and Sabic-El Rayess, 2021). Numerous studies on information equity have examined the economic and demographic characteristics of groups as a starting point. These studies suggest that these characteristics play a role in shaping information needs access to information sources and its utilization within these groups. In essence, groups with social or economic attributes tend to have better access to information resources compared to less privileged groups (Lievrouw and Farb, 2003).

2.3. Equity in open science and public access

Over the last several years, a growing number of voices across scientific disciplines have called attention to how various dimensions of open science—including

models of open publishing, infrastructures and standards for data sharing, citation, and evaluation practices, etc.—counterintuitively amplify inequities that pervade science and the academy. The open science movement has not centered on the needs of underrepresented groups, including minoritized racial, ethnic, and gender groups among scientists (Santoro, 2021; Nelson and Zanti, 2020), vulnerable groups such as early career researchers (Bahlai et al., 2019), or the resource disparities across global geopolitical divisions (Bezuidenhout et al., 2017).

In their review of threats to equity in open science, Ross-Hellauer et al. (2022) describe the demonstrable inequities arising from the dynamic of cumulative advantage among researchers and institutions that have the capacity to promote open access and data reuse. Institutions and resources with greater resources and power tend to realize the most gains from open science. In particular, Ross-Hellauer et al. (2022) identify a set of key threats to equity across several dimensions of open science. Open access publishing models that rely on Article Processing Charges (APCs) tend to disadvantage early career researchers and under-resourced groups, as has been long recognized in the academic and publishing communities broadly (NASEM, 2018; Frank et al., 2023). Ross-Hellauer et al. (2022) confirm the stratifications in publishing capacity among researchers and institutions, exacerbated by a widespread shift to APCs. In addition, making data open and reusable is highly resource-intensive, and the costs are not borne equitably among different groups in academia (Ross-Hellauer et al., 2022). Even open models of scientific evaluation, such as open peer review, can lead to power imbalances for example, among junior and senior researchers. These examples of how cumulative advantage amplifies the inequities that already pervade academia stand in stark contrast to a commonly held objective of open science, which is to democratize access to and participation in knowledge production (Ross-Hellauer et al., 2022).

Bezuidenhout et al. (2017) characterize global disparities in access to and capacity for facilitating the reuse of scientific data and research. As Shanahan and Bezuidenhout (2022) describe, implementing Findable, Accessible, Interoperable, and Reusable (FAIR) principles relies on services and resources that are not equitably accessible to institutions and researchers across the globe. These resources include persistent identifiers, metadata protocols, registries, preservation infrastructures, and relevant training. Discussions of equity within the implementation of FAIR must integrate awareness of the global disparities in access to these resources, and the need for equitable development of capacity and infrastructures to promote FAIR data, or else the expansion of FAIR data requirements may reinforce existing access inequities (Shanahan and Bezuidenhout, 2022).

Awareness of this range of equity issues has begun to influence scientific policy, most visibly in the inclusion of "equity" as a major criterion in the Nelson memo. Yet, policymakers and decision-makers that influence how policy is implemented, including within scientific publishing, libraries, repositories, scientific labs, research centers, and academic units, etc., hold widely varying conceptions of equity and its implications for their own institutions' practices and policies. This is unsurprising, given how recently the concept has taken root within the open science discourse. This study aims in part to characterize this variability in the concept of equity and its implications for access, focusing on federal agencies as key players in the setting and implementation of federal policy around public access to research results.

Public Access is the right of the public to receive suitable access to social, political, aesthetic, and other ideas and experiences (Bollinger, 1976). Public access has various benefits such as public empowerment, advanced knowledge and science, and advocates for innovation initiatives (Courtney, 2012). *'Public access equals government censorship,' and 'Government is seeking to nationalize science* (Hagemann, 2007, p.155). Guidelines for public access are rooted in principles of open science such as the use of FAIR principles outlined in the Office of Science and Technology Policy (OSTP) Memo to guide public access implementation (Shanahan and Bezuidenhout, 2022). It's not just the public that lacks access, but college and university researchers face serious problems, too. This leads to teaching what faculty have access to, rather than what the students most need to know (English and Raphael, 2006; Camfield et al., 2020). *"Research scientists need immediate access to all relevant articles so that they can browse and go from one study to another without delay."* (English and Raphael, 2006, p. 31). Supporters of access to research funded by the government argue that taxpayers, including researchers, should have swift access to the outcomes of publicly funded research. A key problem arises from the fact that science is global, but taxation is national (Kaiser, 2006; Van Noorden, 2013; Dominik et al., 2022). English and Raphael (2006) also discussed a longstanding issue of escalating prices for scientific journals forcing many academic and research libraries to reduce their subscriptions. Ross Hellauer et al. (2022) highlighted that researchers from well-funded institutions tend to have access to research materials putting those from less-resourced backgrounds at a disadvantage. This creates a paradox where despite the abundance of information accessing research literature becomes increasingly challenging for users.

3. Method

This study was conducted as a qualitative content analysis (Zhang and Wildemuth, 2016) for interpreting equity in federal agency public access plans published in response to the Nelson memo (2022).

Table 1. Federal agencies included in the study.
Administration for Community Living (ACL)
Agency for Healthcare Research and Quality (AHRQ)
Department of Education (DoEd)
Department of Energy (DOE)
National Aeronautics and Space Administration (NASA)
National Institute of Standards and Technology (NIST)
National Institutes of Health (NIH)
National Science Foundation (NSF)
Social Security Administration (SSA)
U.S. Census Bureau
United States Agency for International Development (USAID)
United States Department of Agriculture (USDA)
United States Geological Survey (USGS)

These chosen agency plans are largely in draft form and have been published for public comment. The deadline for the final publication of agency plans is December 31, 2024. By May 2024, 13 of 22 agencies subject to the Nelson Memo had published their draft plans (Science.gov).

The analysis process started with identifying references to the concept of equity in each plan through searches with the search term, "equit*" to have a broad search result for example equity and equitable. For each occurrence of the term, we assessed (a) whether the plan offered an implicit or explicit definition of the term, (b) whether that definition differed from public accessibility, and, if so, (c) what equity means or entails within the context of each plan.

The analysis process then continued with the development of codes which were further refined and grouped into broader factors for uncovering patterns and relationships in the data. In the initial coding phase, we identified key elements such as machine-readability, process automation, economic impacts, and developing processes.

This qualitative content analysis provides a foundation for an ongoing, second phase of this research, which is conducting interviews with representatives of federal agencies to dig deeper into how they conceptualize and implement the concept of equity in access to research results. Preliminary results were presented by one of the authors in the Open Repository 2024 International Conference as an ongoing study in an extended proposal. The received comments from practitioners in libraries, publishing, and other sectors were taken into consideration in developing this paper.

4. Findings

Of the 13 plans examined, 11 explicitly reference "equity" (beyond the term's inclusion in the Nelson Memo title, which is referenced in every agency plan). Of those 11 that reference the concept of equity, six use the concept in such a way that it is indistinguishable from, or implicitly equivalent to, the concept of open access or public access. As an example of this implicit equivalency, the DoEd plan states, *"Ensuring access and sharing also creates a more equitable research environment in which researchers have access to resources regardless of their career stage, scholarly network connections, institution type, or resources"* (DoEd, 2023). The statement suggests that access and accessibility are sufficient to improve equity in public access. As another example, the NASA plan states, *"Improving public access to promote the rapid sharing of federally funded research data with appropriate protections and accountability measures will allow for greater validity of research results and more equitable access to data resources aligned with these ideals."* (NASA, 2023).

Five federal agency plans meaningfully distinguish equity from public accessibility. They are:

- Administration for Community Living (ACL)
- Agency for Healthcare Research and Quality (AHRQ)
- National Science Foundation (NSF)
- United States Department of Agriculture (USDA)
- Social Security Administration (SSA)

Among these five plans, each offers different implicit and explicit definitions of equity or operationalizes the concept in different ways. Specifically, we identified 18 distinct factors in how these five agencies characterize equitable access to scientific research results. Two of the plans, from USDA and NSF, were particularly robust in their treatment of equity as a concept and as an objective. Of the 18 identified factors in equitable access to research results, the USDA plan alone accounted for 5 and the NSF plan for 10. Tables 2, 3, 4, and 5 each list a subset

of the 18 factors, and associate each with the agency plans that reference the factor.

Note that the SSA plan acknowledges a distinction between equity and public access but does not explicitly connect equity as a goal to any specific aspect of their plan, which focuses mainly on improving access (Social Security Administration, 2023). For this reason, SSA is listed among the five agencies that distinguish the concepts but do not appear in Tables 2-5.

Each factor identified is focused on a different group of stakeholders in open science. We have identified and categorized the following main groups: 1) Research users and re-users, 2) Research creators and sharers, 3) Publishers, and 4) Broader public communities. We explain more about each of these groups and the factors that seem most immediately focused on each group below.

There is overlap among these categories, and the lines are blurry. All scientists who create and share research also rely on the research of others and thus are users and sometimes also re-users of scientific research results. The distinction between immediate users and broader communities and the public is also vague, as anyone may be construed as a potential user of research results in the open science paradigm. Yet, the distinctions help us understand the rhetorical and pragmatic priorities of how agencies are implementing the concept of equity, and where their focus lies. In addition, many of the factors might fit into several categories at once. For example, ensuring section 508 compliance benefits every user group, yet we have categorized it as mainly focused on all communities and the broader public for the sake of simplicity. In addition, machine-readability (the representation of data and publications in such a way that they can be used by computers without losing their semantic meaning) is frequently associated with and technically related to compatibility with assistive devices and section 508 compliance, to support users with disabilities. We distinguish the aspect of machine-readability that focuses on computational analysis possibilities from the aspect more related to section 508 compliance and categorize the former as mainly focused on research users and re-users. We explain more about each of these groups and the factors that seem most immediately focused on each group below.

Table 2. Research users and re-users' group.

Nr	Factor in equity by agency plan	Agency
1	Machine-readability (to support analysis, reuse)	ACL, AHRQ, USDA, NSF
2	Ensuring open reuse rights where possible	AHRQ
3	Integration with internal and external sources (to promote accessibility, equity)	USDA

The factors in the Research users and re-users' group (Factors 1-3) focus on supporting equitable access for and among the people and organizations that are the immediate or primary user groups for shared research results, including professional scientific researchers in academia, government, and industry. These factors include ensuring machine-readability (automatability) to support immediate computational analysis or computational reproducibility of shared research data, publications, and other results (factor 1); ensuring rights schemas are in place to allow for maximal reuse (factor 2); and integrating data and contextual information across sources to allow for increased access, discovery, and contextualization of research results (factor 3).

Table 3. Research creators and sharers group.

Nr.	Factor in equity by agency plan	Agency
4	Minimizing impact of article processing charges, especially on small awards.	NSF
5	Minimizing negative impact on funding for other research and training activities.	NSF
6	Promoting use of Author's Accepted Manuscripts as alternative to gold OA.	NSF
7	Process automation to promote accessibility, immediacy.	USDA
8	Supporting data infrastructures for under-resourced and underserved institutions and/or researchers.	NSF
9	Making the submission platform inclusive to extramural researchers.	USDA
10	Addressing inequities caused by the full range of costs of data provision.	NSF

The factors in the Research creators and sharers group (Factors 4-10) focus on increasing the capacity of and improving technical infrastructures for equitably sharing or providing research results. They include mitigating the impact of open access requirements on the availability and equitable distribution of research funding (factors 4-6); ensuring data platforms accommodate under-resourced groups, and that processes are efficient and automated where possible (factors 7-9); and assessing the full range of costs entailed in the sharing of research data, and ensuring those costs are equitably distributed (factor 10).

Table 4. Publishers group.

Nr.	Factor in equity by agency plan	Agency
11	Minimizing economic impacts on vulnerable subscription-reliant organizations.	NSF

A single factor pertained to the Publishers group (Factor 11), one among many types of intermediary organization that serves to mediate access to and enable scientific research and communication. This factor, from the NSF plan, considers how the many other equity provisions described in the plan might cause harm to small or otherwise vulnerable, subscription-reliant publishers of scientific research. For example, NSF encouraging reliance on Author's Accepted Manuscripts (which are deposited and made accessible through open-access repositories rather than conventional publishers) could pose an existential threat to small scientific publishers, which are a critical part of the scientific communications ecosystem, and therefore also an equity concern.

Table 5. Broader public communities' groups.

Nr.	Factor in equity by agency plan	Agency
12	Compatibility with assistive devices, section 508 compliance.	ACL, AHRQ, USDA, NSF
13	Minimizing access barriers related to language, interpretability.	NSF
14	Involving communities (esp. vulnerable groups) in issues of data collection, governance, access, disposition.	NSF
15	Outreach and training for the public and community.	USDA
16	Minimizing potential negative impacts with respect to public trust.	NSF
17	Reporting mechanism to promote compliance with this policy.	USDA
18	Developing processes for addressing sharing/access inequities.	NSF

The factors in the Broader public communities' group (Factors 12-18) consider the equity impacts on broader communities, within and beyond academia and extending to public communities, that are affected by science. These communities encompass the users and creators of scientific research but also extend to diverse and widespread communities whose data are deployed in scientific research, and the broader public, which is affected directly and indirectly by the advancement and communication of scientific research. These factors pertain to making science accessible and understandable broadly, across barriers of language, ability, and expertise (factors 12-13); involving communities in decisions about their own data, throughout their lifecycles (factor 14); increasing the capacity of communities to understand and engage with scientific research (factor 15); ensuring that research results are not misused to the detriment of public trust in science (factor 16); and effectively administering the public access policies through reporting, compliance, and assessment mechanisms specifically focused on equity assessment (factors 17-18).

5. Discussion

This study has sought to answer the question of how federal agencies are responding to the requirement for equity in the Nelson Memo. As the findings show, very few plans to date take equity meaningfully into account as a concept distinct from public access; and among those that do, there is little consensus on the meaning and entailments of equity in public access to research results. This confirms what we know from prior work, including Lucy et al. (1977) and Young (1995), that equity is a complex notion that can easily be misinterpreted and must be defined and connoted to the contextual situation it is used. However, the 18 factors identified raise a broad range of equity concerns, each of which centers on a different group of stakeholders in open science. We organize the rest of this discussion around those groups.

Research users and re-users

The factors related to this group emphasize the importance of equitable access for primary user groups of shared research results, highlighting the need for machine-readability, rights schemas, and data

integration to support usability and contextualization. However, Ross-Hellauer et al., 2022; NASEM, 2018 suggest that while these measures aim to democratize access, they may inadvertently amplify existing inequities due to resource disparities. Institutions with greater resources benefit more from open science practices, widening the gap between well-resourced and under-resourced researchers and institutions (Ross-Hellauer et al., 2022; NASEM, 2018). The cost of open access models, such as Article Processing Charges (APCs), disadvantages early career and under-resourced researchers (NASEM, 2018; Frank et al., 2023), and the resource-intensive nature of making data open and reusable disproportionately affects less advantaged groups (Ross-Hellauer et al., 2022). Implementing FAIR principles depends on resources not uniformly available globally, further exacerbating disparities (Bezuidenhot et al., 2017; Shanahan and Bezuidenhout, 2022). Additionally, varied understandings of equity among policymakers influence the implementation of open science policies, potentially perpetuating inequities (Ross-Hellauer et al., 2022). Therefore, while practical measures such as machine-readability and rights schemas are crucial, they must be coupled with efforts to address underlying resource inequities to ensure true democratization of knowledge access and participation. This underscores the need for comprehensive strategies beyond technical solutions to include equitable resource distribution and policy implementations that reflect the diverse needs of the global research community.

Research creators and sharers

The factors influencing research creators and sharers emphasize enhancing technical infrastructures to equitably share research results, which involves mitigating the impact of public access requirements on research funding, ensuring data platforms accommodate under-resourced groups, and implementing efficient, automated processes. Further, there is a need to assess and equitably distribute the full range of costs of sharing research data. Thus, equity in this context extends beyond merely providing equal resources; it necessitates provisioning differently to address disparities in opportunity, as pinpointed by Carleton and Porter (2018). Recognizing that economic disadvantage is not randomly distributed across social groups (Svara and Brunet, 2020), the emphasis on social equity involves fairness and justice in the development and delivery of government policies and services (Frederickson, 2015; Gooden, 2015; Guy and McCandless, 2012; Riccucci, 2009). This active commitment to fairness and justice, as explained by Svara and Brunet (2020), is crucial in public policy formulation, service distribution, and management of institutions serving the public. The economic and demographic characteristics of groups influence their information needs, access, and utilization, with more privileged groups having better access to information resources (Lievrouw and Farb, 2003). Thus, ensuring equity in research sharing requires a multidimensional approach that includes improving technical infrastructures, accommodating under-resourced groups, and addressing the broader social and economic disparities that affect access to information and research resources. This comprehensive strategy aligns with the principles of social equity, aiming to create a more just and fair system for disseminating and utilizing research outputs.

Publishers

The findings reveal a nuanced understanding of the challenges and benefits of public access to scientific research, particularly highlighting the impacts on small publishers. The NSF plan's consideration of equity provisions points out the potential harm to subscription-reliant publishers, particularly those that are small or otherwise vulnerable. Encouraging reliance on Author's Accepted Manuscripts, accessible through open-access repositories, poses a threat to the financial viability of these publishers, which are essential to the scientific communications ecosystem. This concern is underscored by the broader theoretical framework of public access, which emphasizes the public's right to access a wide array of ideas and experiences, including scientific knowledge (Bollinger, 1976). Public access is advocated for its role in empowering the public, advancing knowledge, and fostering innovation (Courtney, 2012). However, it also faces criticism, such as fears of government censorship and the nationalization of science (Hagemann, 2007). The implementation of public access guidelines, rooted in FAIR principles, aims to enhance accessibility and transparency (Shanahan and Bezuidenhout, 2022). Therefore, while public access initiatives are designed to democratize scientific knowledge, they must also address the potential adverse effects on smaller publishers to ensure a balanced and equitable scientific communications landscape. In addition, the agency plans are not explicit about the potential equity impacts on the many other intermediary groups and organizations that make scientific communication possible, including libraries and repositories.

Broader public communities

The findings highlight the importance of considering equity impacts on broader communities affected by scientific research. This includes not only

the users and creators of scientific data but also diverse and widespread communities whose data are utilized in research, as well as the public who are directly and indirectly influenced by scientific advancements and communication. Key factors include making science accessible and comprehensible across barriers of language, ability, and expertise; involving communities in decisions about their data throughout its lifecycle; enhancing community capacity to engage with scientific research; preventing misuse of research results to maintain public trust in science; and effectively managing public access policies through equity-focused reporting, compliance, and assessment mechanisms. Bollinger, (1976) and Courtney, (2012) underscore the right of the public to access social, political, aesthetic, and scientific ideas, advocating for public empowerment, advanced knowledge, and innovation (Bollinger, 1976; Courtney, 2012). Despite global science and national taxation issues, supporters argue that taxpayers should have swift access to government-funded research outcomes (Kaiser, 2006; Van Noorden, 2013). Moreover, researchers from under-resourced backgrounds face disadvantages compared to those from well-funded institutions, creating inequities in access to research results (Ross-Hellauer et al., 2022). Addressing these challenges requires comprehensive public access policies that prioritize equitable access and engagement for all communities.

With this study focused on clarifying how federal agencies are responding to the requirement for equity in the Nelson Memo, the concept of equity is still very much in development within the context of open science, public access, and open access. Considering that the analyzed public access plans are in draft mode, there is mainly focus on key stakeholder groups, with an emphasis on the research users and re-users, research creators and sharers, publishers as well as broader public communities.

There are two main research implications of this study. First, the concept of equity in public access to research results needs to be comprehensively and explicitly reconceptualized. In this regard, we found that there is a need to differentiate between equity and accessibility in the context of public access among most federal agencies responding to the Nelson memo, and it seems likely that this variance also exists within broader affected organizations and sectors. Second, we also identify a preliminary set of 18 factors in equity that may serve as a foundation for conceptualizing and implementing equity in the context of public access to research results.

In terms of implications in practice, we offer two contributions. First, this study will help expand federal agencies' conceptions of equity, as they move ahead in their responses to the Nelson memo, and their broader pursuits of increasing transparency and public access. Second, the factors may help represent priority areas for allocating sufficient focus and effort. This will allow the research results to expand beyond accessibility boundaries.

We propose that future research continues to explore the equity in public access to research results from the perspective of university librarians, users of publicly accessible articles and data, and researchers that federally fund. Future work should also consider the alignment of factors in federal agency plans with the broader research literature on equity in open science. In addition, there is a need to understand the roles of numerous other stakeholders, academic libraries, repositories, publishers, scientific research centers, and more in ensuring equitable access to scientific research. This study serves as a foundation for an ongoing interview-based study with federal agency representatives, which aims to produce a comprehensive framework for implementing and assessing equity in federally funded research access.

6. Conclusion

The aim of this study was to clarify how federal agencies in their public access plans are responding to the requirement for equity in the Nelson Memo. To this end and with the presented findings, this study of public access plans has demonstrated that there is little consensus on the meaning of equity in the context of public access to research results, with great variance among agency responses to the Nelson memo. Considering all plans are drafts, a first attempt, five agency responses meaningfully distinguished "equity" from "public access".

The insight is that many other factors are also considered in this initial path to increasing equity in public access to scientific research results. A further insight from this study is that there is a need for a comprehensive and equitable approach to public access publication, with a focus on addressing potential disparities among equity in publishing and sharing the research results, equity in accessing research results, and equity in getting funded by funding agencies, for instance, under-resourced universities, black colleges, and tribal colleges.

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