Case Study

Encontros Bibli

Open Science practices and policies in public universities: the case of the National University of Córdoba, Argentina

Práticas e políticas de ciência aberta em universidades públicas: o caso da Universidade Nacional de Córdoba, Argentina

Augustín Zanotti
Universidad Nacional de Córdoba, Consejo Nacional de Investigaciones Científicas y Técnicas, Villa Maria, Argentina.
azanotti@unvm.edu.ar
https://orcid.org/0000-0002-7662-7593

Lúcia Céspedes
Universidad Nacional de Córdoba, Consejo Nacional de Investigaciones Científicas y Técnicas, Villa Maria, Argentina.
lucia.cespedes@unc.edu.ar
https://orcid.org/0000-0001-5896-3377

Agustín Mauro
Universidad Nacional de Córdoba, Consejo Nacional de Investigaciones Científicas y Técnicas, Villa Maria, Argentina.
agustinfmauro@gmail.com
https://orcid.org/0000-0002-6052-3757

A lista completa com informações dos autores está no final do artigo

RESUMO

Objetivo: O artigo apresenta os resultados de um estudo de caso que examina as práticas e políticas de Ciência Aberta (CA) na Universidade Nacional de Córdoba (UNC), a segunda maior universidade da Argentina. O estudo concentra-se em três dos quatro pilares da CA, conforme definidos pela UNESCO em 2021: conhecimento científico aberto, infraestruturas de ciência aberta e engajamento aberto com atores sociais, especialmente a ciência cidadã.
Método: Em meados de 2021, foi implementada uma pesquisa apoiada pelas Secretarias de Ciência e Tecnologia de diversas escolas, direcionada a professores e pesquisadores da UNC. Com base nesses dados primários, aprofundamos em casos selecionados por meio da análise de fontes secundárias. Além disso, foram realizadas consultas com informantes-chave, incluindo líderes de projetos de Ciência Aberta, participantes e pessoal administrativo universitário.
Resultado: No domínio do conhecimento científico aberto, o Acesso Aberto (AA) destaca-se como a atividade mais desenvolvida, respaldada por um repositório institucional e uma crescente coleção de mais de 100 periódicos de AA diamante. Outras práticas, como dados de pesquisa abertos, software e hardware abertos, e recursos educacionais abertos, têm uma presença menos expressiva. No contexto das infraestruturas científicas e acadêmicas, plataformas abertas implementadas localmente coexistem com um número crescente de serviços comerciais terceirizados. Projetos emergentes de ciência cidadã são evidentes em diversos campos, enquanto nas ciências sociais e humanidades, ocasionalmente, se cruzam com iniciativas de extensão universitária.
Conclusões: As universidades públicas constituem um pilar fundamental na produção de conhecimento na Argentina e na América Latina como um todo. Compreender a dinâmica e o apoio local para a Ciência Aberta é essencial. Este estudo contribui para capturar tendências, implementações e impactos relevantes para a região.
PALAVRAS-CHAVE: Conhecimento científico aberto. Infraestrutura aberta. Ciência cidadã. Política científica.

ABSTRACT

Objective: The article presents the outcomes of a case study examining Open Science (OS) practices and policies at the National University of Córdoba (UNC), the second-largest university in Argentina. The study focuses on three out of the four pillars of OS, as defined by UNESCO in 2021: open scientific knowledge, open science infrastructures, and open engagement with societal actors, particularly citizen science.
Methods: In mid-2021, a survey supported by the Science and Technology Secretaries of various schools was implemented, targeting UNC professors and researchers. Building upon this primary data, we further investigated selected cases through the analysis of secondary data sources. Additionally, consultations with key informants, including OS project leaders, participants, and university administration staff, were conducted.

Results: In the domain of open scientific knowledge, Open Access (OA) stands out as the most developed activity, supported by an institutional repository and a growing collection of over 100 diamond OA journals. Other practices such as open research data, open software and hardware, and open educational resources are less extended. Within scientific and academic infrastructures, locally implemented open platforms coexist with a rising number of outsourced commercial services. Emerging citizen science projects are evident in various fields, while in the social sciences and humanities, they occasionally intersect with university extension initiatives.
Conclusions: Public universities constitute a fundamental pillar of knowledge production in Argentina and Latin America at large. Understanding the dynamics and local support for Open Science is essential. This study contributes to capturing trends, implementations, and impacts relevant to the region.
KEYWORDS: Open scientific knowledge. Open infrastructure. Citizen science. Science policy

1 INTRODUCTION

Open and collaborative practices are becoming increasingly prevalent in scientific and scholarly circles, fostering interactions among diverse stakeholders, including corporations, governments, academics, experts, and non-experts. In recent years, these trends, aimed at revitalizing scientific culture, have gravitated towards the concept of Open Science (OS). OS has emerged as a distinct field of research, with a growing body of scientific literature assessing practices and impacts across various contexts (Unesco, 2023).

OS is relevant for Global South countries since it has the potential to reduce academic dependency by redistributing capabilities and resources, engaging with issues unattended by mainstream science, and creating opportunities for new innovative activities (Van Zwanenberg *et al.*, 2017). However, the design of strategies and policies vary widely among (semi)peripheral countries.

Latin America has a firmly established tradition in certain OS areas; particularly, diamond open access publishing, with institutions that have become international references on the matter. This has enabled a rich scholarly and political conversation between the region and other knowledge production centers, both in the Global North and South.

Besides, in the last decade, many Latin American countries have passed OS legislation at different levels. We can recognize an interplay between top-down policies, closely tied with legislation arising from different levels of government, and bottom-up experiences and definitions of OS. Nonetheless, there is still little systematic research on this regard. It is therefore highly relevant to understand how OS initiatives are implemented in research institutions in the region.

Public universities are fundamental pillars of knowledge production in Latin America. They contribute to educational accessibility, conduct research addressing regional challenges, foster innovation, and have significant cultural and social impact. They also train crucial professionals for national development, engagement in policy formulation, and international collaborations. Therefore, our primary research question is: what types of OS

initiatives are implemented, and how are they supported at an institutional level in Argentinian universities?

To deepen our understanding of the sustainability of current OS practices, we conducted selected case studies on universities in the province of Córdoba, Argentina[1]. Within this frame, this article presents the findings of the study conducted at the National University of Córdoba (UNC)[2]. As the second-largest university in Argentina, founded in 1613, this institution currently boasts 180,000 students across 15 schools, offering 347 undergraduate and graduate programs. Additionally, it houses 145 research institutes, 25 libraries, 17 museums, and many other facilities (UNC, 2023a). Of particular interest is its pioneering role in establishing one of the first Open Knowledge Offices in the region, integrating open access, open data, and open archives policies. This office operates within the framework of an Open University institutional design, placing emphasis on transparency, citizen participation, and collaboration (UNC, 2023b).

The article is organized as follows. In the first section, we offer a review of the evolution and definitions of the concept of OS. We characterize OS as an emerging and multidimensional term that has recently been stabilized. Moving on to the second section, we describe the research methodology and instruments employed in this study. In the third section, we present our findings concerning OS practices at UNC. These include open scientific knowledge (such as open access, open data, open-source software and hardware, and open educational resources), open science infrastructures, and open engagement of societal actors. Finally, we discuss and systematize the main results and reflect on the consequences of these OS policies as they are currently implemented, as well as potential implications for future research directions and public policy design.

1.1 **Open Science and Open Knowledge**

The current context is one of rapidly changing conditions in the production and circulation of knowledge. Possibilities for openness and collaboration expand, hand in hand with new digital technologies, while challenging traditional scientific practices and culture (Fressoli; De Filippo, 2021). Some of such challenges are reflected in new institutional forms

[1] This study is part of the project “Collaborative and open knowledge production in universities in Córdoba province”, directed by Dr. Hernán Morero and co-directed by Dr. Patricia Rivero. This project took four cases: National University of Córdoba, Catholic University of Córdoba, Province University of Córdoba, and National University of Villa María.

[2] The abbreviation UNC will be used throughout this article, which corresponds to the University’s official denomination in Spanish, *Universidad Nacional de Córdoba.*

that bring together scholars and research teams (micro-level), scientific institutions and funding agencies (meso-level), and public policies and international regulations (macro-level) (Albagli; Maciel; Abdo, 2015).

Fry, Schroeder and Den Besten (2009) highlight a double aspect of OS: openness in the different phases of research and development, and openness in the degree of collaboration among the agents involved. In their analysis of different definitions of OS - including those of the European Commission and the FOSTER Project-, Abadal and Anglada (2020) identify some shared fundamental traits: openness, transparency, and content reuse.

Figure 1: UNESCO's Recommendation OS components

Source: Unesco (2023)

As seen in Figure 1, the UNESCO Recommendation has been an effort to articulate a variety of practices on OS in a coherent framework. This definition was approved in

November 2021 by 193 countries (Boai, 2022). Among its aims, we can mention those of promoting a common definition of OS, including its core values and principles, creating an adequate normative context, investing in open infrastructures and services, investing in human resources, education, digital literacies, and capacity building, fostering an open culture and harmonizing incentives, promoting innovative approaches to every stage of the research process, and fostering international, multiparty cooperation in order to reduce digital and knowledge gaps (Unesco, 2021).

Given a shared definition, recent efforts are now aiming to map out the status and trends of OS practices around the world (Araújo; Appel, 2021; Andrade Maia; Guedes Farias, 2021; Rodrigues; Lourenço; Dias, 2022; Simard *et al.*, 2022; Silveira *et al.*, 2023). It has been observed that, while a growing number of countries are charting their paths towards more open national scientific systems, the lack of equity in access to funding, skills, and tools is maintaining gaps between communities and regions (Unesco, 2023). Scholars are also increasingly highlighting some deviations or unintended effects of OS implementations, such as the shift of business practices by oligopoly publishers (Butler *et al.*, 2023), which entail the spread of Article Processing Charges (APC) with abusive prices, million-dollar transformative agreements, impositions by publishers on the intellectual property rights of works, the emergence of predatory or fraudulent journals posing as open publications, or new payment models for allowing the deposit in a repository of accepted versions (Melero; Uribe-Tirado; Armengou, 2023).

1.2 **Open Science Policies in Latin America and in Argentina**

Adoption of OS presents opportunities and challenges for Global South countries that must participate according to their possibilities and interests (Asinsten *et al.*, 2022; Nardi, 2021; Prieto Mena, 2022). Open infrastructures have become, in this sense, an issue of contention. Repositories, management systems, and Current Research Information Systems (CRIS) platforms require highly qualified staff, as well as adequate funding for technological development and application, among other associated costs (Beigel, 2022; Ross-Hellauer *et al.*, 2022). A similar case is observed with open data and their potential to generate added value based on the processing of large data sets and bases. Such capacities do not always exist in peripheral countries, which are therefore forced to hire private services provided, most of the time, by transnational corporations.

According to De Filippo and D'Onofrio (2019), OS policies are about State actions[3] and strategies tending to the promotion of OS principles and practices, specifically from those organizations responsible for the formulation and coordination of Science and Technology (S&T) policies, funding agencies, and national research councils.

While OS policies gain popularity worldwide, the region has a decades-long tradition in Open Access (OA), boasting thousands of indexed diamond journals. These do not charge readers nor authors, operate outside commercial editorial circuits, and are typically managed by universities or academic societies (Beigel; Gallardo, 2022). Alongside diamond journals, institutional repositories are the preferred OA instruments (Comité Asesor en Ciencia Abierta y Ciudadana, 2022; Red Placts, 2022).

The tradition of openness and the involvement of non-experts in research in Latin America also has deep roots. Examples include participatory action research, Southern epistemologies, and popular education (Botero, 2021). Moreover, certain scholarly institutions strongly advocate for engaging in a dialogue with other knowledge systems. Prominent among them are CLACSO, Redalyc, Scielo, Latindex, La Referencia, and, most recently, AmeliCA.

Following De Filippo and D'Onofrio's (2019) comparative study, seven countries have passed legislation on OS in the last decade: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. The majority of these policies are oriented towards promoting OA. Grassroots experiences are also flourishing, with some integrated into networks such as the 'Red Latinoamericana de Tecnologías Libres' (reGOSH) and the 'Red Iberoamericana de Ciencia Participativa' (RICAP) (Arancio, 2021).

In alignment with this regional panorama, Argentina established its National System of Digital Repositories ('Sistema Nacional de Repositorios Digitales', SNRD) in 2011. Subsequently, in 2013, National Law 26899 was enacted to mandate that all S&T productions funded from public sources, including primary research data, must be made available via green OA (Zanotti *et al.*, 2021). As of early 2024, the SNRD has amassed 480,000 documents across 48 repositories from both public and private institutions (MINCYT, 2024).

2 METHODS

[3] We understand public policies as a set of decisions and actions sustained in time. This configures disputed fields, instead of a lineal, coherent and deliberate design process (Dagnino et al., 2002).

Our study is aimed at characterizing OS practices in the university field in the province of Córdoba, Argentina. This constitutes a first step towards a more comprehensive mapping of these initiatives and their ties with institutional policies. UNC was chosen for further in-depth scrutiny because of its volume, relevance, diversity of active OS projects and policies.

Two main sources of data collection were employed: a survey and the analysis of secondary sources. The survey was created using Google Forms and distributed among professors and researchers at the UNC during May-June 2021. We received support from the S&T Secretaries of various schools to send out invitations to participate from official email accounts, emphasizing the voluntary and anonymous nature of the survey. The survey form contained both closed and open-ended questions, serving as both a control and a complement to the provided answers. We received a total of 157 responses from scholars across a diverse range of disciplines, including social sciences and humanities, agrarian sciences, engineering and material sciences, biology and health, natural and exact sciences, computer science, and applied technology (for a fine-grained statistical analysis of this survey, see Magallanes Udovicich *et al.*, 2023).

We then proceeded to analyze secondary data sources, concentrating on a selection of noteworthy cases from the survey. When required, we directly consulted with OS project leaders, participants, and university administration staff. Our objective was to deepen our understanding of the processes and demands inherent in OS practices, as well as their connections to both intra- and extra-university agents. Details about each initiative were registered, filed, analyzed, and later classified[4] according to the four pillars for a global open science system as defined by Unesco in its 'Recommendation on Open Science' (2021):

1. **Open scientific knowledge** refers to open access to scientific publications, research data, metadata, open educational resources, open source software and open hardware. These are available in the public domain or under an open license that allows access, re-use, repurpose, adaptation and distribution.
2. **Open science infrastructures** refer to virtual or physical research infrastructures, including open labs, open science platforms, repositories for publications, research data and source codes, software forges and digital research services.
3. **Open engagement of societal actors** refers to extended collaboration between scientists and societal actors beyond the scientific community, including

[4] These data collection instruments, the survey template and grid for case registration, together with the registered cases, have been published and are freely available. See Mauro, Céspedes and Zanotti (2024).

crowdfunding, crowdsourcing, scientific volunteering, citizen and participatory science.

4. **Open dialogue with other knowledge systems** refers to inter-relationships and complementarities between diverse epistemologies, including indigenous peoples, marginalized scholars and local communities.

Purposefully, we left out the last OS pillar for this study. Interactions between OS and other knowledge systems - in accordance with principles of research ethics, non-discrimination, and human rights - deserve further reflections and methodological approaches that are beyond the scope of the present paper.

3 RESULTS

As anticipated, one of UNC's distinctive features is the establishment of the Open Knowledge Office (Oficina de Conocimiento Abierto, OCA) in 2014. The Office plays a multifaceted role in OS at the University, managing a journal portal and the institutional university repository, while also providing support and training in OA and publishing (Nardi; Yrusta, 2014). Notably, OCA was recently incorporated into the Comité Asesor en Ciencia Abierta y Ciudadana of Argentina's Ministry of Science, Technology, and Innovation, actively participating as a node in crafting Unesco's OS Recommendation (UNC, 2022b).

Moreover, UNC places high importance on the public communication of S&T. In alignment with this objective, the science news agency UNCiencia was founded in 2015, guided by the motto "Public University = Public Knowledge"[5].

3.1 Open scientific knowledge

3.1.1 Open Access

OA to scientific knowledge is possibly one of OS's most established dimensions[6]. Its antecedents date back to the Budapest Open Access Initiative Declarations (2002, 2012), the Bethesda Statement on Open Access Publishing (2003), the Berlin Declaration on Open

[5]A growing trend among public universities in Argentina is the establishment of their own science news agencies and outlets. Examples include Agencia CTyS from the National University of La Matanza, Agencia TSS from the National University of San Martín, AgNo from the National University of Quilmes, Investiga from the National University of La Plata, among others.

[6] Three main OA routes are recognized: gold OA, in which research results are published in open academic journals (frequently at the cost of APCs afforded by authors or their institutions); green OA, where data and results are publicly stored in digital repositories; and diamond OA, meaning publications which pose no charge for authors nor readers.

Access to Knowledge in the Sciences and Humanities (2003), and, in Latin America, the Salvador Declaration on Open Access (2005).

The roots of OA initiatives at UNC can be traced back to 2009 when a collaborative project was initiated with the Complutense University of Madrid. This project, funded by the Agencia Española de Cooperación Internacional para el Desarrollo, aimed to enhance the visibility of the university community's intellectual production and historical archives. Subsequently, the Journal Portal and the Digital University Repository (Repositorio Digital Universitario, RDU) were established, and nearly 2000 documents of significance to local history were digitized (Nardi; Yrusta, 2014).

The RDU serves as a platform for storing, organizing, preserving, and openly disseminating UNC's scientific, academic, and cultural production. Utilizing the DSpace[7] platform for administering digital collections, the RDU is seamlessly integrated into the SNRD. Currently, it hosts over 26,000 open-access documents (RDU, 2023)

The Journal Portal facilitates the management and publication of digital journals with a focus on scientific, academic, or cultural content. Operating on the Open Journal System (OJS)[8] platform, in 2023, the portal hosted 104 diamond OA journals. Notably, one of the prerequisites for a journal to be included is the explicit declaration of its OA policy, specifically regarding not charging any kind of APC (Oficina de Conocimiento Abierto, 2022). Between 2014 and 2021, the Portal recorded over three million views (CBA24N, 2021, December 12).

Our survey identified various open practices in publishing involving a diversity of actors, including learned societies, civil associations, and private clinics. These practices encompass publishing in OA, participating as editorial board members or reviewers, and disseminating research results in institutional repositories. Notably, a significant number of surveyed scholars indicated that they regularly publish their papers and works under some model of OA.

3.1.2 Open Research Data

Open Research Data refers to the availability of data and datasets for free sharing

[7] DSpace is open-source software designed for the creation of institutional digital repositories. It is specifically crafted to manage, store, preserve, and share digital materials, such as academic documents, research, theses, reports, and other types of digital content.

[8] Open Journal Systems (OJS) is an open-source journal management system designed to facilitate the online publication and administration of academic, scientific, and professional journals. It is a non-commercial initiative run by the Public Knowledge Project (PKP).

and (re)use, extending the principles of OA to scientific publications. In Argentina, National Law 26899 mandates the public availability of primary research data. However, the deposition of research data is still in its early stages nationwide. According to a report by the Comité Asesor en Ciencia Abierta y Ciudadana (2022), only 12 out of the 45 repositories in the SNRD host datasets. UNC stands out as one of the national nodes actively working in this direction. A notable initiative towards this goal is the requirement to include data management plans in calls for S&T funding.

Our survey received reports of frequent participation in workshops or training about open data, but there is relatively scarce practical application by researchers and professors. However, the number of available datasets is increasing. Out of the 822 hosted datasets, the majority were uploaded in the last two years (RDU, 2023). Beyond the university and at the level of individual practices, it is noteworthy to mention the voluntary submission of datasets to platforms like the Open Science Framework (OSF). Additionally, there is a collective effort in constructing an open database on demographics in various Latin American and Caribbean countries, known as the s-Alyc Project.

Another notable local initiative is the Suquía Repository, established in 2016. It is the first digital institutional repository in South America dedicated to Archaeology and Anthropology. This innovative infrastructure aims to reshape the planning and conceptualization of archaeological practices by facilitating the use and reuse of data generated with public funds (Izeta; Prado; Cattáneo, 2021). The Suquía Repository encompasses databases, reports, and images of excavations, objects, and archaeological collections. At present, it hosts 17000 entries and 7000 digital objects (SUQUÍA, 2023). This repository was established by the Digital Archaeology Program within the context of the Anthropology Institute of Córdoba and the Anthropology Museum, with support from the Williams Foundation (Giordana, 2016).

3.1.3 Open Source Software (OSS) and Open Hardware (OH)

The significance of source code in research has grown considerably in the current landscape of scientific endeavors, given the substantial reliance on digital technologies. Open source software and hardware[9] play versatile roles: they can function as tools for

[9] OSS is published under a license that grants users the rights to use, study, change, and distribute software and its source code. These are developed in a decentralized and collaborative way, relying on peer review and community production. OH refers to the design specifics of a physical object, which are licensed so that it can be studied, modified, created and distributed by any individual. Diagrams, blueprints, designs, drawings, CAD files, among others, are available under permissive licenses (Opensource.com, 2022).

conducting research, represent the outcomes of research, or be the subjects of study themselves. Consequently, their development contributes to the reproducibility of findings and facilitates the exchange of knowledge (Comité Asesor en Ciencia Abierta y Ciudadana, 2022).

In Argentina, National Law 26899 does not explicitly regulate software code, although it does not exclude it either. The National Agency for Research, Technological Development, and Innovation (Agencia I+D+i), the main Argentine funding institution, mandates that all software created with its subsidies and grants must be archived and made publicly available. Additionally, it stipulates that, with the sole exception of duly justified particular situations, all such software must be open source (Comité Asesor en Ciencia Abierta y Ciudadana, 2022).

The survey conducted at UNC reveals that, while the use of Free/Libre and Open Source Software (FLOSS) and OH in research is a common practice for nearly a quarter of the respondents, original developments are relatively scarce. Among the active projects identified, we find Saturar, a Computer Assisted/Aided Qualitative Data Analysis Software (CAQDAS) designed for collecting and coding textual or video data, particularly focused on social science research. The tool has the capability to generate reports and screenshots, along with Python-based data analysis functions (Satur.ar, 2023)

Additionally, Ícaro is an educational robotics suite utilized in elementary and high schools. Comprising a series of OSS packages, it operates on low-cost OH boards to design and control small robots constructed from recycled electronic components. The project has cultivated a community of users, teachers, and developers from various countries. Notably, Ícaro has been included in several national educational programs (Roboticaro.org, 2022).

Another Open Hardware experience is POSTA (Open Source Assistive Technologies Projects), a website that compiles around 50 open design projects. It provides blueprints and instructions for creating and replicating assistive technologies for individuals with different disabilities. The project, initiated in 2017 through collaboration between Università IUAV of Venice (Italy) and UNC, has garnered support from various public and private, local, and national institutions (Posta Project, 2023).

UNC has made significant strides in promoting OSS and OH. In 2011, the university conferred an honorary doctorate upon Richard Stallman, the founder of the Free Software Foundation (Zanotti, 2015). It has also provided a space for Córdoba's Free Software User Group, supported thematic conferences, and established a Center for Open Source Innovation. Notably, in 2020, the RAM Program was launched with the objective of extending

the lifetime of faculty equipment. The program included the replacement of proprietary software with free operating systems in personal computers and laptops (UNC, 2022b).

However, despite the support for grassroots initiatives or activist groups, there is no official institutional statement suggesting or mandating the use of OSS or OH over other developments.

3.1.4 Open Educational Resources

Following UNESCO's definition, OERs are learning, teaching, and research materials, in any format, in the public domain or published under an open license allowing for their free access, reuse, adaptation, and redistribution (Unesco, 2019). At UNC, our survey indicates a certain lack of awareness regarding the specificity of OERs. Participants who expressed involvement in this type of activity mentioned the creation of their own pedagogical materials, sharing them on Learning Management Systems (LMS), or the design and planning of undergraduate and graduate courses.

Since 2011, Ansenuza Repository has been a platform for sharing educational resources created by professors, students, and alumni. Initiated in 2009, led by the Educational Technology Area of the School of Philosophy and Humanities in collaboration with the Ministry of Education of Córdoba Province, the initiative expanded to include all academic units within UNC. Its primary goal was to establish a shared space for storing materials related to teaching training and practice. As of 2023, it has seen the upload of 610 digital objects, including didactic materials, experiences, syllabuses, and research results from various disciplines (Ansenuza, 2023).

Ansenuza's commitment to openness exists alongside other institutional strategies, notably the edX virtual campus, as we will elaborate on in the following section. Therefore, we observe overlapping approaches within the university's administration in this dimension.

3.2 Open Science Infrastructures

Open science infrastructures support and enable OS practices, encompassing various digital platforms—from journal and repository management systems to open labs, data processing and more (UNESCO, 2021). Declarations like BOAI20 (2022) emphasize the importance of investing in OS infrastructures overseen by academic communities, developed collaboratively, and in a decentralized manner. Since 2017, projects like SCOSS (2022) have provided funding for such open technological services.

According to the Comité Asesor en Ciencia Abierta y Ciudadana (2022), science

infrastructures can be thought of as a conjunction of physical (hardware), logical (software) and human (personnel) resources. In turn, they also include practices and strategies that regulate its functioning and interactions with the community.

In the case of universities, OS infrastructures often coexist with other academic digital platforms and services. Specifically, at UNC, we identified locally administered open infrastructures, including DSpace for repositories and OJS for journals. Additionally, Moodle[10] served as the LMS for virtual classrooms, and local services were hosted either by the data center or different schools. Additionally, the university uses the edX virtual campus to offer MOOCs, operating under copyright conditions and providing certificates subject to payment. This arrangement has resulted in foreign currency expenditure for UNC, despite the potential for sourcing similar services locally (Pagano; García, 2020)

While respondents mentioned initiatives such as setting up open laboratories and constructing infrastructures for digital documentary collections, our findings indicate only a few active developments. One noteworthy initiative is the Metadata and Digital Archives Migration Module, a collaborative effort between the OCA and the Pro Secretary of Informatics (UNC, 2019b). Launched in 2019, this module gathers metadata from researchers' production, codes them, and stores them in repositories based on DSpace. The development is published under an AGPL v3.0 license.

The COVID-19 pandemic brought into the spotlight the digital infrastructures that universities depend on for their day-to-day activities. The shift of classrooms to virtual environments required an array of digital services, specifically for communications, cloud storage, and videoconferencing. These needs were predominantly addressed by commercial providers. The professors' union of UNC scrutinized this implementation, putting forth arguments in favor of independent data management and source code control (Pagola, Zanotti; Grasso, 2023).

At present, there is no official institutional statement regarding OS infrastructures. In the balance, criteria are updated with each administration, adapting to pragmatic needs and contexts.

3.3 Open Engagement of Societal Actors

[10] Moodle is an open-source learning management system that facilitates the creation and administration of online courses. It provides a flexible and customizable platform for educators, educational institutions, and organizations.

Unesco defines open engagement of societal actors as “extended collaboration between scientists and societal actors beyond the scientific community, by opening up practices and tools that are part of the research cycle” (Unesco, 2021, p.13). This category encompasses various forms, but in this article we specifically focus on those related to citizen science. The concept goes beyond mere access to results, involving collaboration with citizens in every stage of scientific research, from the formulation of research questions to the communication of results, although instances of such integral participation are considerably fewer.

Recently, most Latin American countries have incorporated mentions of citizen science in the portals of their S&T ministries and offices. Argentina aligns with this trend and distinguishes itself with a national map highlighting citizen science initiatives (Argentina.gob.ar, 2023). However, there is still limited evidence of the integration of citizen science within OS policies in the region. It is primarily associated with volunteer collaboration in data collection, particularly in fields such as ecology and astronomy (Babini; Rovelli, 2020).

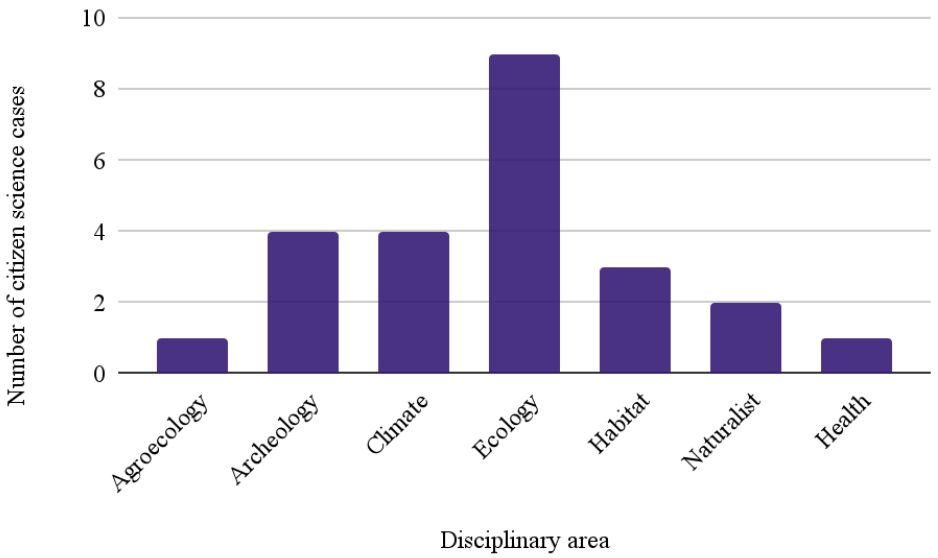
Previous research in Argentina reveals an overlap between citizen science and university extension or outreach (Arza; Fressoli, 2019). In the Latin American tradition, this convergence is often considered the “third mission” of universities, complementing teaching and research. This mission can be defined as a space where educational, ethical, and political experiences are woven together around the production, circulation, and exchange of knowledge with external actors beyond the university (Abratte, 2019).

Many outreach projects address social problems, connecting the university with the community through educational or communication initiatives. However, these efforts may not always integrate scholarly work. Another area of overlap involves citizen science and social sciences research, with some traditions advocating for the active involvement of external agents. To operationalize this category, we specifically selected projects where non-scientific societal agents actively participate in the research process. We focused on topics related to natural sciences in a broad sense, aiming to avoid any potential confusion with participatory methodological approaches in the social sciences.

The survey responses included collaborations with citizens, NGOs, producers, enterprises, and other stakeholders. From our sample, we selected 25 cases that met the conditions to be considered citizen science. These projects span a broad spectrum of disciplinary areas, encompassing agroecology, archaeology, astronomy, climate, ecology,

environment, habitat, and health. The majority of the surveyed projects are concentrated in ecology and environmental sciences.

Figure 2: number of citizen science cases per disciplinary area at UNC.



Source: the authors.

We discovered numerous projects involving open data collection and analysis. Some initiatives in the naturalist realm have established herbariums or utilize apps like iNaturalist to monitor biodiversity. Others focus on categorizing interactions among galaxies or collecting hailstones for climate records. Projects related to environmental conflicts involve non-scientific agents in various stages of their research. For instance, the NucleoDiversus group collaborates on designing socio-ecological resilience projects with different social actors.

Within UNC, several research teams have initiated or currently lead various citizen science projects, indicating an accumulation of capacity and organizational expertise. Examples of these projects include “Cosecheros de Granizo”, “Proyecto MATTEO”, “Cazadores de Crecidas”, and “Proyecto Relámpago”.

While there are no specific university policies for citizen science, there are institutional policies for outreach projects (“extensión universitaria”). These policies are typically highly distributed, with dedicated university-wide and school-specific offices, along with independent calls for funding (Pereyra *et al.*, 2019). These opportunities may readily accept citizen science projects, so even though there is no explicit promotion, existing policies may indeed embrace it.

4 CONCLUSIONS

As has been suggested, OS is an umbrella term encompassing multiple expressions. Its scope has only recently been agreed upon among experts, and many scholars are still unaware of its dimensions and potential benefits. The article outlined public policies adopted in Latin America and Argentina. Within this context, we observed coincidences between UNC and the broader trend towards OS institutionalization in the region.

We reported findings on practices at UNC in three out of four OS pillars. Regarding open scientific knowledge, we reviewed five different manifestations: open access, open data, open source software, open hardware, and open educational resources. The most widely reported activity is OA, supported by institutional repositories and a growing collection of diamond journals across disciplines. However, the deposit of datasets has not yet reached the same level of adoption. Although we reported some original developments of open-source software and open hardware, these initiatives remain relatively isolated and are not integrated into a common framework that fosters their widespread use. OERs represent a similar case.

The emergence of the COVID-19 pandemic highlighted the importance of the academic and scientific infrastructures upon which universities rely. Our findings indicate the presence of locally implemented open platforms for journal portals, repositories, virtual classrooms, and other administrative and data services. These coexist with a growing number of outsourced commercial platforms used for various purposes, including MOOCs, cloud services, video conferencing, and more

While open engagement with societal actors may take different forms, our specific focus was on citizen science. Robust projects are predominantly found in the fields of environmental sciences and ecology. In areas such as social sciences and humanities, they sometimes overlap with university outreach or research traditions involving non-scientists.

In consistency with Unesco's first Open Science Outlook (2023), our inquiry indicates that actions and resources to consolidate OS at UNC are unevenly distributed across pillars and dimensions. Certain open knowledge practices, such as access to publications, research data, or OERs, receive sizable institutional support. Conversely, development of OSS/OH, or the implementation of open science and academic infrastructures, are less considered and more dependent on conjunctions. Regarding open engagement with societal actors, a majority of grassroots experiences were observed. While not explicitly supported as "citizen science" these practices often find alternative paths within the

institution as "university outreach", the third mission of the university, with an important institutional structure and funding.

It is worth noting that one of the areas receiving strong support from the university, specifically OA scientific publishing, is also among the most developed dimensions of OS in Latin America and globally. This field boasts stable and advanced infrastructures. Opting to publish in journals that do not charge APCs is both a political decision and a pragmatic strategy for scholars grappling with resource scarcity and unaffordable payments in foreign currency. However, UNC's institutional efforts to encourage practices in this direction are at odds with prevailing scientific-academic evaluative cultures, which continue to prioritize publications with expensive fees to be paid by authors or readers (Beigel, 2015).

As a result, some tensions were identified between OS policies and the persistence of non-compatible practices and processes (Fressoli; De Filippo, 2021; Mendez, 2021). We are currently in a transitional phase, and while these contradictions are resolved in everyday practice, agents within the scientific field must navigate the challenges posed by often contradictory guidelines and stimuli. In this regard, the implementation of OS policies cannot be done in isolation. It requires a set of complementary policies that intervene in other aspects of scientific knowledge production. For example, it is necessary to reform evaluation systems to prioritize qualitative assessments of research, reduce the emphasis placed on high-impact journals that charge APCs, recognize the diverse profiles of professionals conducting science, and respect the autonomy of nation states to establish evaluative criteria according to their contexts and needs (FOLEC, 2022).

The benefits that OS can bring to the Latin American region depend on the direction OS policies take. However, even a coherent and integrated body of policy will not be sufficient as long as traditional models of scientific production remain the prevalent culture in laboratories and offices. Building on the ideas of Mendez (2021), OS should be embraced as a new scientific *ethos*. OS practices are not only carried out due to institutional requirements, they also respond to individual will or commitment to activism, as shown in this study. Therefore, in agreement with De Giusti (2022), we also identify a persistent need to raise awareness, provide training, and generate incentives toward OS in academic communities. While our case study demonstrates that these actions are regularly carried out by the OCA at UNC, there is still limited widespread appreciation of its value and potential implications.

Given the increasingly complex, digital, data-based, and computationally intensive nature of modern research, it is essential to address the underdeveloped aspects of OS that

pertain to FLOSS and open infrastructures. Without deliberate action to foster the digital infrastructures that sustain scientific production, communities risk becoming overly dependent on commercial platforms, potentially undermining the principles of openness and accessibility that underpin OS.

Furthermore, in a global scientific system that continues to reproduce neocolonial bonds (Boshoff, 2009), badly implemented OS could widen the gap between central and (semi)peripheral countries. At the same time, certain OS practices can drive processes of knowledge reappropriation and decolonization (Aguado-López; Vargas Arbeláez, 2016). Open infrastructures have the potential to create synergies with development projects aimed at fostering learning and capacity building, enhancing local participation in technological production and narrowing specific sector gaps (Hurtado de Mendoza; Zubeldia Brenner, 2017). Such a virtuous process could reduce dependence on privately managed platforms and mitigate concerns about the potential "platformization" of OS (Ross-Hellauer *et al.*, 2022).

To conclude, two questions still stand. First, could a set of top-down policies counter the rest of the entrenched implicit policies? Second, would such policies be compatible with practices that seek greater democratization and horizontality in the integral process of doing science? In this sense, OS policy design itself, at UNC and any other academic institution, could be seen as one more link in a chain of open practices, and include agents already engaging in OS to collaborate in its formulation.

The study of consolidated practices will contribute to steering policies coherently for universities and research institutions. Rather than perceiving OS as an end in itself, we should aspire to create “fairer, more equitable, diverse and inclusive research systems that are better geared towards the production, dissemination, and use of scientific knowledge that helps address societal challenges with benefits for all” (UNESCO, 2023, p. 24). In opposition to openness as a slogan without critical examination or distorted through openwashing, we advocate for a robust political project that aims at a genuine and context-specific democratization of (infra)structures, resources, and circulation circuits of science and technology on a global scale.

REFERENCES

ABADAL, Ernest; ANGLADA, Lluís. Ciencia abierta: cómo han evolucionado la denominación y el concepto. **Anales de Documentación**, v. 23, n. 1, 2020. DOI: https://doi.org/10.6018/analesdoc.378171. Available at: https://revistas.um.es/analesdoc/article/view/378171. Accessed February 2, 2024.

ABRATTE, J. P. Educación y territorios. Pensar lo público en las prácticas extensionistas. **Revista E+E. estudios de extensión en humanidades**, v. 6, n. 7, p. 11-15, 2019. Available at: https://revistas.unc.edu.ar/index.php/EEH/article/view/24204. Accessed February 2, 2024.

AGUADO-LÓPEZ, Eduardo; VARGAS ARBELÁEZ, Esther Juliana. Reapropiación del conocimiento y descolonización: el acceso abierto como proceso de acción política del sur. **Revista Colombiana de Sociología**, v. 39, n. 2, p. 69-88, 2016. DOI: https://doi.org/10.15446/rcs.v39n2.58966. Available at: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-159X2016000200069. Accessed June 6, 2024.

ALBAGLI, Sarita; MACIEL, Maria Lucia; ABDO, Alexandre Hannud (org.). **Ciência aberta, questões abertas**. Brasilia: IBICT, Rio de Janeiro: UNIRIO, 2015. E-book. Available at: http://livroaberto.ibict.br/handle/1/1060. Accessed February 2, 2024.

ANDRADE MAIA, Francisca Clotilde de; GUEDES FARIAS, Maria Giovanna. Revisão por pares aberta: uma análise dos periódicos científicos indexados no Directory of Open Access Journals. **Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação**, v. 26, 2021. DOI: 10.5007/1518-2924.2021.e79506. Available at: https://periodicos.ufsc.br/index.php/eb/article/view/79506. Accessed February 5, 2024.

ANSENUZA. **Repositorio Materiales educativos UNC**. 2023. Available at: https://ansenuza.unc.edu.ar/. Accessed February 5, 2024.

ARANCIO, Julieta Cecilia. **Fabricaciones desde el diálogo: hardware científico abierto y democratización de la producción de conocimiento en la "periferia"**. 2021. Doctoral dissertation (PhD in Science and Technology). Universidad Nacional de Quilmes, Bernal, 2021. Available at: http://ridaa.unq.edu.ar/handle/20.500.11807/3109

ARAÚJO, Ronaldo Ferreira de; APPEL, André Luiz. O financiamento de projetos de pesquisa em ciência aberta: análise de dados da base Dimensions. **Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação**, v. 26, n. Especial, p. 1–19, 2021. DOI: 10.5007/1518-2924.2021.78828. Available at: https://periodicos.ufsc.br/index.php/eb/article/view/78828. Accessed February 4, 2024.

ARGENTINA.GOB.AR. **Ciencia Ciudadana**. Available at: https://www.argentina.gob.ar/ciencia/sact/ciencia-ciudadana. Ciudad Autónoma de Buenos Aires, 2023. Accessed February 5, 2024.

ARZA, Valeria; FRESSOLI, Mariano. Prácticas de ciencia abierta: Instrumento para su análisis ilustrado con información de proyectos científicos argentinos. **Redes: Revista de estudios sociales de la ciencia**, v. 25, n. 48, p. 85-131, 2019. Available at: https://revistaredes.unq.edu.ar/index.php/redes/article/view/63. Accessed February 2, 2024.

ASINSTEN, Julián; CLINIO, Anne; FRESSOLI, Mariano; ROCHA, Luana; ROITBARG, Rocío, SOACHA, Karen. **Ciencia Abierta y la pandemia de Covid-19: Respuestas, desafíos e innovaciones en Argentina, Brasil y Colombia**. Bogotá: Fundación Karisma, 2022. Report. Available at: https://web.karisma.org.co/el-papel-de-la-ciencia-abierta-en-la-contencion-del-covid-19-en-america-latina. Accessed February 2, 2024.

BABINI, Dominique; ROVELLI, Laura. **Tendencias recientes en las políticas científicas de ciencia abierta y acceso abierto en Iberoamérica**. Ciudad Autónoma de Buenos Aires: Fundación Carolina, CLACSO, 2020. E-book. Available at: http://hdl.handle.net/10760/40955. Accessed February 2, 2024.

BEIGEL, M. F. Culturas [evaluativas] alteradas. **Política Universitaria**, v. 2, p. 12-21, 2015. Available at: http://hdl.handle.net/11336/43518. Accessed February 2, 2024.

BEIGEL, M. F. El proyecto de ciencia abierta en un mundo desigual. **Relaciones Internacionales**, n. 50, p. 163-181, 2022. DOI: https://doi.org/10.15366/relacionesinternacionales2022.50.008. Available at: https://revistas.uam.es/relacionesinternacionales/article/view/15331. Accessed February 2, 2024.

BEIGEL, María Fernanda; GALLARDO, Osvaldo. **Estudio de accesibilidad de las publicaciones argentinas y gastos en article processing charges en la Agencia I+d+i: 2013-2020**. Ciudad Autónoma de Buenos Aires: CIECTI, 2022. Dossier. Available at: http://www.ciecti.org.ar/7-estudio-de-accesibilidad-de-las-publicaciones-argentinas-y-gastos-en-article-processing-charges-en-la-agencia-idi-2013-2020/. Accessed February 2, 2024.

BOAI. **La Budapest Open Access Initiative: Recomendaciones en su 20º aniversario**. 2022. Available at: https://www.budapestopenaccessinitiative.org/boai20/boai20-spanish-translation/. Accessed February 5, 2024.

BOSHOFF, N. Neo-colonialism and research collaboration in Central Africa. **Scientometrics**, v. 81, n. 2, p. 413-434, 2009. DOI: https://doi.org/10.1007/s11192-008-2211-8. Accessed February 2, 2024.

BOTERO, C. Ciencia abierta desde el sur. **Arbor**, v. 197, n. 799, a594, 2021. Available at: https://arbor.revistas.csic.es/index.php/arbor/article/view/2408. Accessed February 2, 2024.

BUTLER, Leigh-Anne; MATTHIAS, Lisa; SIMARD, Marc-André; MONGEON, Phillipe; HAUSTEIN, Stefanie. The Oligopoly's Shift to Open Access. How the Big Five Academic Publishers Profit from Article Processing Charges. **Quantitative Science Studies**, p. 1-22, 2023. DOI: https://doi.org/10.1162/qss_a_00272. Accessed February 2, 2024.

CBA24N. La UNC se prestigia a través de sus publicaciones. **cba24n**, Córdoba, December 12, 2021. Available at: https://www.cba24n.com.ar/cordoba/la-unc-se-prestigia-a-traves-de-sus-publicaciones_a61b65f1944600155430e480e. Accessed February 2, 2024.

COMITÉ ASESOR EN CIENCIA ABIERTA Y CIUDADANA. **Diagnóstico y lineamientos para una política de ciencia abierta en Argentina**. Ciudad Autónoma de Buenos Aires: Ministerio de Ciencia, Tecnología e Innovación, 2022. Available at: https://back.argentina.gob.ar/sites/default/files/2023/01/documento_final_comite_cayc_-_dic_22.pdf. Accessed February 4, 2024.

DAGNINO, Renato; THOMAS, Hernán; COSTA, Greiner; GOMES, Erasmo. Metodologia de análise de políticas públicas. In: COSTA, G.; DAGNINO, R. (org.). **Gestão estratégica em políticas públicas**. Campinas: Alínea Editora, 2002, p. 51-113.

DE FILIPPO, Daniela; D'ONOFRIO, María Guillermina. Alcances y limitaciones de la ciencia abierta en Latinoamérica: Análisis de las políticas públicas y publicaciones científicas de la región. **Hipertext.net**, v. 19, p. 32-48, 2019. DOI: https://doi.org/10.31009/hipertext.net.2019.i19.03. Available at: https://raco.cat/index.php/Hipertext/article/view/360106. Accessed February 4, 2024.

DE GIUSTI, M. R. Ciencia abierta: el corazón del problema. **Informatio**, v. 27, n. 1, p. 309-335, 2022. Available at: https://informatio.fic.edu.uy/index.php/informatio/article/view/335. Accessed February 4, 2024.

FOLEC. **Una nueva evaluación académica y científica para una ciencia con relevancia social en América Latina y el Caribe**. México: Consejo Latinoamericano de Ciencias Sociales, 2022. Available at: https://www.clacso.org/una-nueva-evaluacion-academica-y-cientifica-para-una-ciencia-con-relevancia-social-en-america-latina-y-el-caribe. Accessed June 6, 2024.

FRESSOLI, Mariano; DE FILIPPO, Daniela. Nuevos escenarios y desafíos para la ciencia abierta. Entre el optimismo y la incertidumbre. **Arbor**, v. 197, n. 799, a586, 2021. DOI: https://doi.org/10.3989/arbor.2021.799001. Available at: https://arbor.revistas.csic.es/index.php/arbor/article/view/2401. Accessed February 4, 2024.

FRY, Jenny; SCHROEDER, Ralph; DEN BESTEN, Matthijs. Open science in e-science: contingency or policy? **Journal of Documentation**, v. 65, n. 1, p. 6-32, 2009. DOI: https://doi.org/10.1108/00220410910926103. Accessed February 4, 2024.

GIORDANA, P. "Suquía", el repositorio digital de la arqueología de Córdoba. In: **Alfilo**, Córdoba, September 19, 2016. Available at: https://ffyh.unc.edu.ar/alfilo/suquia-el-repositorio-digital-de-la-arqueologia-de-cordoba. Accessed February 4, 2024.

HURTADO DE MENDOZA, Diego Fabián; ZUBELDÍA BRENNER, Lautaro. El rol de las universidades públicas argentinas en el desarrollo económico. **Política Universitaria**, n. 4, p. 24-33, 2017. Available at: http://hdl.handle.net/11336/77299. Accessed June 6, 2024.

IZETA, Andrés; PRADO, Isabel; CATTÁNEO, Roxana. Sentando las bases para una Arqueología Digital en Argentina. El rol de las infraestructuras digitales para la investigación. **InterSecciones en Antropología**, v. 22, n. 1, p. 97-111, 2021. DOI: https://doi.org/10.37176/iea.22.1.2021.595. Available at: https://interseccionesantro.soc.unicen.edu.ar/index.php/intersecciones/article/view/595. Accessed February 4, 2024.

MAGALLANES UDOVICICH, Mariana Loreta; MORERO, Hernán Alejandro; MORENO LÓPEZ, Alejandra; VÉLEZ , Juan Gabriel. El rol de la Universidad en la ciencia abierta. **Integración Y Conocimiento**, v. 12, n. 2, p. 90-116, 2023. DOI: https://doi.org/10.61203/2347-0658.v12.n2.42037. Available at: https://revistas.unc.edu.ar/index.php/integracionyconocimiento/article/view/42037. Accessed February 4, 2024.

MAURO, Agustín; CÉSPEDES, Lucía; ZANOTTI, Agustín. **Open science cases at UNC**. OSF [project], version 1, 2024. https://doi.org/10.17605/OSF.IO/UPG7Y

MELERO, Remedios; URIBE TIRADO, Alejandro; ARMENGOU, Clara. Conocimiento científico abierto, difusión y acceso a la producción académica. Ideas para un debate. **Hipertext. net**, n. 27, p. 1-4, 2023. DOI: https://doi.org/10.31009/hipertext.net.2023.i27.01. Available at: https://raco.cat/index.php/Hipertext/article/view/422167. Accessed February 4, 2024.

MÉNDEZ, E. Open Science por defecto. La nueva normalidad para la investigación. **Arbor**, v. 197, n. 799, a587, 2021. DOI: https://doi.org/10.3989/arbor.2021.799002. Available at: https://arbor.revistas.csic.es/index.php/arbor/article/view/2402. Accessed February 4, 2024.

MINCYT - MINISTERIO DE CIENCIA, TECNOLOGÍA E INNOVACIÓN. **Ciencia Abierta y Ciudadana**. Ciudad Autónoma de Buenos Aires, 2023. Available at: https://www.argentina.gob.ar/ciencia/sact/ciencia-abierta-y-ciudadana. Accessed February 4, 2024.

MINCYT - MINISTERIO DE CIENCIA, TECNOLOGÍA E INNOVACIÓN. **Sistema Nacional de Repositorios Digitales**. 2024. Available at: https://repositoriosdigitales.mincyt.gob.ar/vufind/. Accessed February 5, 2024.

NARDI, A. M. El cambio de paradigma en la comunicación científica. Ciencia abierta en la universidad: Desafíos y obstáculos. In: 19ª JORNADA SOBRE LA BIBLIOTECA DIGITAL UNIVERSITARIA (JBDU), 2021, Buenos Aires.

NARDI, Alejandra Marcel; YRUSTA, Lucas. Ciencia Abierta y los desafíos de la Oficina de Conocimiento Abierto de la UNC. In: 12ª JORNADA SOBRE LA BIBLIOTECA DIGITAL UNIVERSITARIA, 2014, Salta.

OFICINA DE CONOCIMIENTO ABIERTO. **Requisitos para el portal**. Available at: https://oca.unc.edu.ar/requisitos-para-el-portal/. N/D. Accessed October 27, 2022.

OPENSOURCE.COM. **What is open hardware?** Available at: https://opensource.com/resources/what-open-hardware. N/D. Accessed February 5, 2024.

PAGANO, Miguel; GARCÍA, Luis Ignacio. Cuarentena, educación y virtualidad. **Indómita**, April 10, 2020. Available at: https://indomita.conadu.org.ar/capital-docente/cuarentena-educacion-y-virtualidad-por-miguel-pagano-y-luis-ignacio-garcia/. Accessed February 4, 2024.

PAGOLA, Lila Isabel; ZANOTTI, Agustín; GRASSO, Mauricio. Reflexiones sobre modalidades pedagógicas, plataformización y educación en la universidad pública pospandemia. **InMediaciones De La Comunicación**, v. 19, n. 1, p. 283-300, 2023. DOI: https://doi.org/10.18861/ic.2024.19.1.3572. Available at: https://revistas.ort.edu.uy/inmediaciones-de-la-comunicacion/article/view/3572. Accessed February 4, 2024.

PEREYRA, Liliana V.; MATTIO, Eduardo; DOMINGUEZ, Alejandra; OLIVA, Marcos; NATTA, Pablo; SAFFE, Juan. En gestión: Trayectorias y desafíos en torno a la gestión de la extensión hoy en la UNC. **E+E: Estudios de Extensión en Humanidades**, v. 6, n. 8, p. 2-15, 2019. Available at: https://revistas.unc.edu.ar/index.php/EEH/article/view/26157. Accessed February 4, 2024.

POSTA PROJECT. **POSTA. Proyectos Open Source de Tecnologías Asistivas**. 2023. Available at: https://www.postaproject.org/. Accessed February 5, 2024.

PRIETO MENA, D. Ciencia Abierta: desafíos y oportunidades para Uruguay y el Sur Global. **Informatio**, v. 27, n. 1, p. 253-283, 2022. DOI: https://doi.org/10.35643/Info.27.1.5. Available at: https://informatio.fic.edu.uy/index.php/informatio/article/view/336. Accessed February 4, 2024.

RED PLACTS. Propuestas para una política soberana en materia de publicaciones científicas. **Ciencia, tecnología y política**, v. 5, n. 9, 086, 2022. DOI: https://doi.org/10.24215/26183188e086. Available at: https://revistas.unlp.edu.ar/CTyP/article/view/14522. Accessed February 4, 2024.

RDU. **Repositorio Digital de la UNC**. 2023. Available at: https://rdu.unc.edu.ar/

ROBOTICARO.ORG. **Robótica Educativa**. 2022. Available at: https://roboticaro.org/

RODRIGUES, Marcello Mundim; LOURENÇO, Cíntia de Azevedo; DIAS, Guilherme Ataíde. A natureza de conjuntos de dados científicos em repositórios sul-americanos: um levantamento de formatos e extensões. **Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação**, v. 27, n. 1, p. 1–26, 2022. DOI: 10.5007/1518-2924.2022.e85148. Available at: https://periodicos.ufsc.br/index.php/eb/article/view/85148. Accessed February 5, 2024.

ROSS-HELLAUER, Tony; REICHMANN, Stefan; COLE, Nicki Lisa; FESSL, Angela; KLEBEL, Thomas; PONTIKA, Nancy. Dynamics of cumulative advantage and threats to equity in open science: A scoping review. **Royal Society Open Science**, v. 9, n. 1, 211032, 2022. DOI: https://doi.org/10.1098/rsos.211032. Available at: https://royalsocietypublishing.org/doi/10.1098/rsos.211032. Accessed February 4, 2024.

SATUR.AR. **Software para metodologías de investigación cualitativas**. 2023. Available at: http://satur.ar/. Accessed February 5, 2024.

SCOSS. **The Global Sustainability Coalition for Open Science Services**. 2022. Available at: https://scoss.org/. Accessed February 5, 2024.

SILVEIRA, Lúcia da et al. Taxonomia da Ciência Aberta: revisada e ampliada. **Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação**, v. 28, p. 1–22, 2023. DOI: 10.5007/1518-2924.2023.e91712. Available at: https://periodicos.ufsc.br/index.php/eb/article/view/91712. Accessed February 4, 2024.

SIMARD, Marc-André; GHIASI, Gita; MONGEON, Philippe; LARIVIÈRE, Vincent. National differences in dissemination and use of open access literature. **PLOS ONE**, v. 17, n. 8, e0272730, 2022. DOI: https://doi.org/10.1371/journal.pone.0272730. Accessed February 4, 2024.

SUQUÍA. **Repositorio Digital del Programa de Arqueología Digital**. 2023. Available at: https://suquia.ffyh.unc.edu.ar/. Accessed February 5, 2024.

UNC - UNIVERSIDAD NACIONAL DE CÓRDOBA. **Programa RAM**. Available at: https://ram.unc.edu.ar/. 2022a. Accessed February 5, 2024.

UNC - UNIVERSIDAD NACIONAL DE CÓRDOBA. **La UNC forma parte del nuevo Comité Asesor en Ciencia Abierta y Ciudadana**. 2022b. Available at:

https://www.unc.edu.ar/comunicaci%C3%B3n/la-unc-forma-parte-del-nuevo-comit%C3%A9-asesor-en-ciencia-abierta-y-ciudadana. Accessed February 5, 2024.

UNC - UNIVERSIDAD NACIONAL DE CÓRDOBA. **Sobre la UNC**. 2023a. Available at: https://www.unc.edu.ar/sobre-la-unc/. Accessed February 5, 2024.

UNC - UNIVERSIDAD NACIONAL DE CÓRDOBA. **Universidad Abierta**. 2023b. Available at: https://www.unc.edu.ar/innovaci%C3%B3n/universidad-abierta. Accessed February 5, 2024.

UNESCO. **Recommendation on Open Educational Resources (OER)**. 2019. Available at: https://en.unesco.org/about-us/legal-affairs/recommendation-open-educational-resources-oer. Accessed February 5, 2024.

UNESCO. **Consulta Regional Virtual sobre la Recomendación de la UNESCO en Ciencia Abierta**. 2020. Available at: https://es.unesco.org/sites/default/files/reporte_de_la_consulta_regional_sobre_ciencia_abierta_23-9.pdf. Accessed February 5, 2024.

UNESCO. **Unesco Recommendation on Open Science**. 2021. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000379949. Accessed February 5, 2024.

UNESCO. **Unesco Open Science Outlook 1: Status and trends around the world**. 2023. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000387324. Accessed February 5, 2024.

VAN ZWANENBERG, Patrick; FRESSOLI, Mariano; ARZA, Valeria; SMITH, Adrian; MARIN, Anabel. Open and Collaborative Developments. Working paper 98, **STEPS Centre**, Brighton, UK, July 27, 2017. Available at: https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/13128. Accessed February 5, 2024.

ZANOTTI, A. El software libre y su difusión en Argentina: mercado, Estado, sociedad. **Poliantea**, v. 11, p. 147-166, 2015. DOI: https://doi.org/10.15765/plnt.v11i21.707. Available at: https://journal.poligran.edu.co/index.php/poliantea/article/view/707. Accessed February 4, 2024.

ZANOTTI, Agustín; ISOGLIO, Antonela; PICCOTTO, Natalia. Implementación de la política nacional de acceso abierto en tres instituciones argentinas. **Palabra Clave (La Plata)**, v. 10, n. 2, e123, 2021. DOI: https://doi.org/10.24215/18539912e123. Available at: https://www.palabraclave.fahce.unlp.edu.ar/article/view/PCe123. Accessed February 4, 2024.

NOTAS

CONTRIBUIÇÃO DE AUTORIA

Concepção e elaboração do manuscrito: A. Zanotti, L. Céspedes, A. Mauro
Coleta de dados: A. Zanotti, L. Céspedes, A. Mauro
Análise de dados: A. Zanotti, L. Céspedes, A. Mauro
Discussão dos resultados: A. Zanotti, L. Céspedes, A. Mauro
Revisão e aprovação: A. Zanotti, L. Céspedes, A. Mauro

CONJUNTO DE DADOS DE PESQUISA

FINANCIAMENTO

This work was funded by the Ministry of Science and Technology of Córdoba, under grant N° 81/2019, Grupo Reciente Formación con Tutores.

CONSENTIMENTO DE USO DE IMAGEM

Não se aplica.

APROVAÇÃO DE COMITÊ DE ÉTICA EM PESQUISA

Não se aplica.

CONFLITO DE INTERESSES

Não se aplica.

LICENÇA DE USO

PUBLISHER

Universidade Federal de Santa Catarina. Programa de Pós-graduação em Ciência da Informação. Publicação no Portal de Periódicos UFSC. As ideias expressadas neste artigo são de responsabilidade de seus autores, não representando, necessariamente, a opinião dos editores ou da universidade.

EDITORES

HISTÓRICO

Recebido em: 06-02-2024 – Aprovado em: 28-06-2024 - Publicado em: 13-09-2024.