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The institutional repository for the 2030 Agenda's sustainable development goals

The contribution of the institutional repository to the Sustainable Development Goals of the 2030 Agenda

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Summary

The United Nations (UN) 2030 Agenda establishes 17 Sustainable Development Goals (SDGs) that guide global actions toward human, social, environmental, and economic development. In this context, Institutional Repositories (IRs), by promoting open access to scientific, academic, and educational production, prove to be strategic instruments for achieving associated goals, especially SDG 4 – Quality Education, but also others such as SDG 9 (Industry, Innovation, and Infrastructure) and SDG 16 (Peace, Justice, and Strong Institutions). This article discusses the role of institutional repositories in promoting the SDGs, highlighting their potential to democratize knowledge, strengthen open science, and foster sustainability practices in higher education institutions.

Keywords: Institutional Repositories; Sustainable Development Goals; Open Access; Open Science; Quality Education.

Summary

The United Nations (UN) Agenda 2030 establishes 17 Sustainable Development Objectives (SDGs) that guide global actions towards human, social, environmental and economic development. In this context, the Institutional Repositories (RI), to promote open access to scientific, academic and educational production, become strategic instruments for achieving associated objectives, in particular SDG 4 (Quality Education), but also others such as SDG 9 (Industry, Innovation and Infrastructure) and el SDG 16 (Peace, Justice and Solid Institutions). This article analyzes the role of institutional repositories in promoting the SDGs, highlighting their potential to democratize knowledge, strengthen open science and promote sustainability practices in higher education institutions.

Keywords: Institutional Repositories; Sustainable Development Objectives; Open Access; Open Science; Quality Education.

1. Introduction

The creation of the Sustainable Development Goals (SDGs) by the UN in 2015 brought a new paradigm for public and institutional policies at a global level. Among the 17 objectives and 169 proposed goals, actions aimed at eradicating poverty, promoting health and well-being, gender equality, innovation, peace and justice, with particular emphasis on ensuring a inclusive, equitable and quality education (SDG 4).

Universities and research centers play a fundamental role in this scenario, since produce knowledge that supports strategic decisions in different spheres. In this context, Institutional Repositories (RI) are consolidating themselves as tools for disseminating content open access scientific and educational material, directly approaching the principles of the Agenda 2030. This article proposes a critical analysis of the contribution of IRs to the SDGs, especially

in light of open access practices and Open Educational Resources (OER).

The 2030 Agenda represents an international commitment signed by 193 Member States. members of the United Nations in favor of a development model centered on sustainability, equity and human dignity. With the definition of 17 Global Goals, Sustainable Development Goals (SDGs), the UN establishes a political and strategic framework for action governmental, institutional and civic. Higher education institutions (HEIs), as spaces of production and dissemination of knowledge, play a strategic role in achieving these objectives.

In this context, Institutional Repositories emerge as essential tools for promotion of Open Science and quality education, contributing to the democratization of access to information, civic education, and strengthening partnerships. This article aims to discuss the contribution of institutional repositories to the SDGs, highlighting their potential and limitations in Brazilian institutions.

2. INSTITUTIONAL REPOSITORIES AND OPEN ACCESS POLICIES

A digital library is an organized collection of digital materials — such as texts, videos and audio files — with tools for access, search, organization, and preservation. Its goal is to offer accessible and relevant content for education and research, with technical infrastructure and appropriate professional. These libraries use metadata, standardized protocols and systems of indexing that ensures efficient access and future expansion.

> The expression 'digital repositories', in the context of open access, is used to refer to the various types of data provider applications that are intended for the management of scientific information, necessarily constituting alternative channels of scientific communication. (LEITE, 2009)

According to Leite (2009), based on these attributes, every institutional access repository open can be considered a type of digital library, but not every digital library can be considered an institutional repository. Thus, an institutional repository is formed by a set of services and technologies that enable the collection, management, access, dissemination and preservation of digital materials created by an institution. Although most of these repositories is located in higher education institutions such as universities and colleges, they also can be found in museums, government agencies, businesses, and other organizations. In universities and colleges, institutional repositories are generally managed by library, with the purpose of storing and disseminating content such as scientific articles before and after the publication, theses, dissertations, internship reports, technical documents, books, chapters of books, teaching materials, event proceedings, as well as audio and video recordings, among others resources aimed at education.

> The term "digital repositories," in the context of the global open access movement, is used to describe the various types of data providers that constitute alternative avenues for scholarly communication. Each type of digital repository has specific functions within the scholarly communication system and specific applications tailored to the environment in which it will be used.
>
> (SAYÃO et al, 2009)

These are institutional repositories, as a component of the implementation of the concept of science open, which play an important role in ensuring user access to information in global society, where its interoperability is fundamental to facilitate the global discovery of content in the educational context. Under the influence of the open access movement, the metadata management has become one of the most dynamic areas in the development of digital repositories, where they sought to develop specific tools to facilitate the search for informational materials in view of the widespread dissemination, enabling their accessibility and reducing the effort required to find quality materials. These parameters consist in the implementation of search engines such as keyword, format, language, sites and size, as also specific criteria, such as types of use of the material and specific licenses, thus ensuring a delimitation for research.

Thus, defining policies that guarantee its purpose as availability, assigns to its users play important roles that promote continued sharing of submitted resources in the system. According to the Open Archival Information System Model – OAIS (Consultative Committee for Space Data Systems, 2012), the main roles of repository users are: producer, one who develops resources to be made available, shared and preserved by repository; manager, one who defines policies in a broader domain, as part of a organization, or even for the scientific community specifically; consumer, the one who seeks interaction with the repository by obtaining digital resources according to your interests in particular.

According to Leite (2009),

> There are a large number of platforms for creating institutional repositories.
> However, some essential characteristics must be present in the functionalities of a software so that it efficiently meets the demands of a repository in line with open access.

The most widely used software for creating institutional repositories is DSpace, developed by the Massachusetts Institute of Technology (MIT) in collaboration with Hewlett-Packard Corporation (www.duraspace.org), which is characterized by being software under a contract of open source, which has the function of playing the role of a digital library.

DSpace software can be described as a system composed of: storage: which acts as a physical repository for the metadata associated with the content; business logic: in charge of managing the stored content, the system users (e-people), the permissions

access and work processes; application: formed by components that interact with the environment external to the specific DSpace installation.

A university or institution needs a digital repository to store articles scientific papers and dissertations produced by its academic community. In this context, DSpace stands out as an essential tool, as it allows not only the creation of communities, but also of collections, such as Academic Resources. Furthermore, it offers the functionality of self-archiving of these collections, an indispensable resource for the efficient management of a repository institutional.

The main reasons for choosing DSpace when implementing institutional repositories include: being open source software, allowing customization according to the needs of the university or institution; present features that make its installation and operation simple, for both systems analysts and repository managers; offer an interface intuitive, facilitating use by the entire academic community; having a basic set of functionalities that can be expanded or integrated with complementary services and tools academic ecosystem.

Sustainability has gained prominence in higher education libraries, especially in the use of institutional repositories to preserve and disseminate scientific production. To this end, it is essential to adopt efficient and sustainable technologies. Studies indicate that institutional policies mandatory deposits increase the use of these repositories. Furthermore, there is an increase in quality of metadata and information semantics, consolidating repositories as part of reality current academic.

> Institutional repositories... They constitute a powerful alternative that, from the point of view of availability and unrestricted access to information, enhances the production of knowledge and, from the point of view of information dissemination, provides visibility and maximizing the impact of research results by expanding their access.
> (LEITE, 2009)

The inclusion of materials in institutional repositories (IRs) does not guarantee their effective use in education. To be useful, these resources must be open, reusable, educationally relevant, interoperable, and connected to other platforms. This enables educational practices open and the integration of content into teaching.

IRs support institutional open access strategies, enabling curation, updating and personalization of content, in addition to its preservation. However, for its success, it is essential ensure technical standards, quality control, good information retrieval and respect for copyright.

These repositories directly contribute to SDGs 4 (quality education) and 9 (innovation and infrastructure), promoting continuous learning and innovation. Despite the advances technological, Brazil still faces inequalities in digital access, requiring coordinated actions

to ensure connectivity and educational inclusion.

3. INSTITUTIONAL REPOSITORIES AND SDG 4 – QUALITY EDUCATION

SDG 4 has as one of its targets "to ensure equitable access to technical education, professional and superior quality". The IRs, by making theses, dissertations, and other studies available free of charge, articles, books and teaching materials, enable access to content that would otherwise be restricted to privileged subscriptions or institutions.

When associated with the Open Educational Resources (OER) policy, IRs strengthen the educational inclusion, promote innovative pedagogical practices and contribute to the formation of teachers and students, especially in developing countries. Thus, they become not only mechanisms for preserving knowledge, but active agents in reducing inequalities educational.

By making academic materials such as theses, dissertations, articles, freely available, reports and educational productions, IRs act as facilitators of inclusive and equitable education. It is common, for example, for universities in less-privileged regions to benefit from access remote to the production of national reference institutions.

IRs can also host Open Educational Resources (OER), allowing reuse, adaptation and redistribution of content. This practice is directly related to digital inclusion and to teacher training, expanding pedagogical and methodological horizons.

4. OPEN ACCESS IN THE EDUCATIONAL CONTEXT

The origins of Open Access are strongly linked to the technological advances of the 1990s. 1990, with the expansion of the internet and the possibility of disseminating information on a global scale. In this context, researchers began to question the traditional publishing model scientific, where the results of publicly funded research were often accessible only to those who could afford scientific journals or were linked to them educational institutions with access to this content.

Open Science encompasses various aspects of scientific production, covering different perspectives, often divergent, but which align around distribution, access and production of scientific knowledge free from legal, technological or social barriers. In this context, the Open Access movement stands out, which advocates for the wide, free availability and public disclosure of scientific research results. Similarly, the open data movement encourages the accessible publication of scientific and public interest data, such as information governmental and climate change. While promoting openness, the movement also values protection

of anonymity and sensitive personal data, prioritizing collective security over exposure indiscriminate.

> Open access in this context means making articles freely available to the public on the Internet, allowing any user to read, download, copy, distribute, print, search, or create links to the full texts of articles, as well as capture them for indexing or use them for any other legal purpose. (LEITE, 2009)

UNESCO's Open Science Action Plan (2021) reinforces the importance of repositories as strategic tools to democratize access to scientific knowledge. The plan presents guidelines that highlight the need to promote open access to publications, data and educational materials, enabling science to be more inclusive and equitable; strengthening the global collaboration by connecting institutional repositories and open platforms; facilitating integration of open educational resources (OER) and other scientific materials to the goals of the 2030 Agenda, particularly in the context of SDG 4, which seeks to ensure quality education for all.

The globalization of society cannot be achieved without ensuring open access to its scientific resources, essential to driving scientific and technological progress. Various programs, projects and documents prepared by international organizations, such as the European Union European, UNESCO, the International Federation of Library Associations and Institutions (IFLA), among others, aim to ensure access to global knowledge. These efforts seek offer open access to relevant information, aligning with global disclosure practices results of research conducted by scientists in open access. According to the Declaration of Berlin (2003), for open access to consolidate itself as an advantageous practice, it is necessary to active involvement of all people responsible for the production of scientific knowledge.

Open access to technical, scientific and academic production through online digital databases contributes significantly to the improvement of other research, the results of which are reflected in a improvement of new products and services to society, where institutional repositories allow the commitment of institutions to the issue of sustainability and assist as a tool for support for decision-making.

Open education has attracted considerable attention and discussion for several years, but in the However, it is a complex concept, subject to different interpretations, in which openness can be considered as open access or as licensed open resources or even as openness as open educational resources and with several related elements. According to Otsuka et al. (2015), few actions have been promoted so that these resources are produced and shared as open educational resources, favoring reuse and collaborative production. Thus, it seeks promote the use and sharing of resources in an open manner, based on the idea that education is shaped by diverse contexts, where these contexts highlight the importance of methods varied teaching and learning.

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One of the first relevant initiatives was the Open Archives Initiative
Initiative - OAI), launched in 1999. The OAI aimed to create an open digital archive system,
allowing researchers to deposit their publications in online repositories, making them
content available to anyone with internet access. The idea of self-archiving has become
a central tenet of the Open Access movement, allowing authors to deposit their
publications in institutional or thematic repositories, without the need for intermediation of
traditional publishers.

> Kramer and Klebl (2011) discuss the potential of Edu-sharing, an open-source repository portal that supports the development of reusable content and encourages collaborative practices among educators. Such initiatives demonstrate alignment with the educational sustainability goals outlined in SDG 4.

Starting in the 2000s, several government and funding institutions began
to support the Open Access initiative, recognizing the value of making research results
publicly funded institutions accessible to all. For example, the National Institutes of Health (NIH)
The United States adopted a policy in 2008 that requires all research funded by the
government are made openly available in public repositories. This approach was
fundamental for the consolidation of the Open Access movement, showing that free access to
knowledge is not only feasible, but also essential for global scientific advancement.

Formal consolidation for this concept begins to take place when the Open Society
Foundations and other international organizations have begun to support the development of materials
open educational systems and the use of digital technologies to disseminate knowledge. Over the years,
In the 2000s, with the popularization of the internet, several platforms began to offer resources
digital educational materials, promoting the open and collaborative sharing of these materials.

5. SUSTAINABLE DEVELOPMENT GOALS (SDGs) IN PROMOTING QUALITY EDUCATION (SDG 4)

Before the SDGs, the Millennium Development Goals (MDGs) focused on themes
such as poverty and health, with less attention to sustainability. Since ECO-92 and the 2030 Agenda,
sustainable development has become a global priority, integrating economic aspects,
social and environmental.

In Brazil, cooperation with the UN has evolved through milestones such as the UNDAF and the current
Framework for Partnership for Sustainable Development, which aligns the country with the 2030 Agenda. This
multilateral cooperation involves government, UN, private sector, academia and civil society, with actions
centered on the five pillars of the Agenda: People, Planet, Prosperity, Peace and Partnerships.

The 2030 Agenda establishes measurable goals with indicators to guide public policies
sustainable. This approach represents a shift in the way we understand the relationship between

society and nature.

Education, especially in higher education, is seen as key to achieving the SDGs, for through strengthening civic and professional skills focused on sustainability. The universities, now recognized as protagonists in the 2030 Agenda, have an essential role in promoting critical education, innovation, research and leadership to transform society.

> Education must find ways to respond to these challenges, taking into account multiple worldviews and other knowledge systems, as well as new frontiers in science and technology, such as advances in neuroscience and digital technology.
> Rethinking the purpose of education and the organization of learning has never been more urgent. (UNESCO, 2016)

One of the foundations of the 2030 Agenda for Sustainable Development is the availability of high-quality education and scientific knowledge. The Development Goal Sustainable 4 (Quality Education) highlights the importance of ensuring inclusive education, fair and high-quality information for all. Institutional repositories help achieve this goal by offer scientific and academic production free of charge, promoting accessibility to knowledge in worldwide level.

Although SDG 4 is most directly associated with the repositories, there are relevant intersections with other objectives, such as:

• SDG 9 – Industry, Innovation and Infrastructure: By bringing together technological research, data open and applied scientific publications, IRs favor innovation, supporting startups, entrepreneurs and evidence-based public policies.

• SDG 5 – Gender Equality: Repositories with gender-sensitive metadata policies gender and diversity allow studies on inequality in scientific production and can promote equity actions.

• SDG 17 – Partnerships for the Goals: Inter-institutional sharing of repositories, interoperability of systems and adoption of international standards strengthen global collaborations for sustainable development.

• **Case Studies and Relevant Initiatives** Projects such as RBRD (Brazilian Network of Digital Repositories), the UFU Repository, the UNICAMP Educational Repository and the initiative COAR (Confederation of Open Access Repositories) show the diversity and potential of IRs in Brazil and the world.

• Integration between systems (e.g. OAI-PMH), use of metadata standards such as Dublin Core and the adoption of Creative Commons licenses expand the possibilities for reuse and visibility International.

Open education is an emerging trend that seeks to innovatively integrate and significant exchange of ideas between educators, resources and digital culture, prioritizing

cooperation and interaction. This educational perspective is based on the idea that everyone should have the freedom to use, adapt, improve and redistribute educational resources, without limitations. This view is shared by several groups, including teachers and students, who are working together to make education more accessible and efficient.

Sharing knowledge openly is essential for economic development and for learning in the digital age, benefiting future generations. Aligned with UN SDG 4, which seeks to guarantee quality and inclusive education, universities have been incorporating the SDGs into its practices, expanding actions, publications and partnerships to fulfill the 2030 Agenda.

Universities have the duty and the capacity to promote the Development Goals Sustainable Development Goals (SDGs), training conscious professionals and leaders. With millions of students, they impact society through teaching, research, extension and pedagogical innovation. By integrating the SDGs in their activities contribute to the development of skills and critical thinking, strengthening its social role and adapting to the demands of today's world.

> It is well established that universities are a key partner in delivering all the SDGs. Universities' capabilities in education, research, and innovation, as well as their contribution to civic, social, and community leadership, mean they have a unique role in helping society address these challenges. (KESTIN; LUMBRERAS; PUCH, 2020)

International initiatives, such as that of the Massachusetts Institute of Technology (MIT) in United States, were pioneers in making Open Educational Resources (OER) available through through their courses. From this action, several other higher education institutions around the world came together to create the Open Education Consortium (OEC), which promotes access to education Open Access (EA) and OER, with information available on the website http://www.oeconsortium.org. Other important initiative is OER Universitas, a consortium of universities from different countries that offers and certifies participation in open courses based exclusively on OER, with details on the website https://oeru.org. In the field of open textbooks for higher education, the following stand out: OpenStax, in the United States, available at http://openstax.org, and the Latin Project in America Latina, accessible through the website http://www.proyectolatin.org.

One of the main pillars of the 4 Sustainable Development Goals (SDGs) is to ensure that everyone, regardless of their social, economic or geographical status, has access to quality education.

The type of content produced directly influences its sustainability and the way it is can be used and reused. For example, a digital image can be easily inserted into a document, while a physical book requires scanning and format compatibility to allow its reuse.

Sustainable Development Goal 4 (SDG) highlights the importance of ensuring that everyone has access to a high standard of education and lifelong learning opportunities.

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Another important point of Sustainable Development Goals 4 (SDGs) is to promote the concept of lifelong education, in which informational materials become a essential tool for this, as they offer opportunities for continuous learning, even after the completion of formal education. Professionals can access courses and resources for updating and continuous improvement, and people of different ages can learn at their own pace. MOOCs (Massive Open Online Courses) platforms and self-directed courses based on Open Educational Resources (OER) have been fundamental to the creation of an education flexible and accessible, where students can learn according to their own availability time and independently (McAndrew et al., 2010).

The changes that are taking place have a major impact on education, signaling the emergence of a new global landscape for learning. Although not all of these transformations require an immediate response through educational policies, they create conditions that need be considered. These changes require not only the adoption of new practices, but also the formation of new perspectives to understand the nature of learning and the role of knowledge and education in human development.

This new context of social transformations demands a deep reflection on the objectives of education and the structuring of learning, with the teacher being responsible for finding resources pedagogical methods that encourage the active participation of students, guiding them in the integration of pre-existing knowledge with new information acquired through interactions with different content sources available.

CONCLUSION

Institutional Repositories, by providing free and open access to knowledge academic, represent strategic instruments in promoting the Development Goals Sustainable, especially in the educational, scientific, and technological fields. Its strengthening depends the engagement of managers, librarians, researchers and public policy makers. The integration between IRs and SDGs represents not only an opportunity for transformation institutional, but also an ethical commitment to the future of humanity.

Despite the potential of repositories, several challenges limit their effectiveness as tools for the SDGs with the low rate of self-archiving by authors; the lack of consolidated institutional policies for the use of OER; lack of knowledge on the part of teachers and students about the functionalities and advantages of IRs; the lack of interoperability between national and international platforms.

On the other hand, the growing engagement of institutions with open science, the

development of open data policies and the recognition of IRs as means of assessment institutional framework point to a promising scenario. Projects such as the Brazilian Network of Repositories Digital (RBRD) and the COAR (Confederation of Open Access Repositories) initiative reinforce this trend.

Among the main challenges is the lack of knowledge on the part of the community academic; the low rate of self-archiving; the lack of clear institutional policies; the little integration between repositories and educational portals.

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