Thesis Certification: The Role of BrCris in the Integration and Management of Academic Production in Brazil

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Certificación de tesis: el rol de BrCris en la integración y gestión de la producción académica en Brasil

ABSTRACT

The Brazilian scientific production has shown expressive but heterogeneous growth. BrCris is a system that integrates information from several databases to provide a complete view of the research process. It aims to certify and standardize scientific data, strengthening the reliability and quality of information. In this work, a case study is carried out to certify theses and dissertations registered in the Lattes Platform, using the Brazilian Portal of Open Access Publications and Research Data (Oasisbr). As a result of the adopted strategies, it was possible to certify approximately 700,000 theses and dissertations in the Lattes Platform curricula, providing greater reliability and access to certified documents.

RESUMEN

La producción científica brasileña muestra un crecimiento significativo, aunque heterogéneo. BrCris es un sistema que integra información de diversas bases de datos para ofrecer una visión completa del proceso de investigación. Su objetivo es certificar y estandarizar los datos científicos, fortaleciendo la confiabilidad y calidad de la información. En este trabajo, se realiza un estudio de caso para certificar tesis y disertaciones registradas en la Plataforma Lattes, utilizando el Portal Brasileño de Publicaciones y Datos Científicos de Acceso Abierto (Oasisbr). Como resultado de las estrategias adoptadas, fue posible certificar aproximadamente 700,000 tesis y disertaciones en los currículos de la Plataforma Lattes, proporcionando mayor confiabilidad y acceso a los documentos certificados.

KEYWORDS

BrCris; Data Certification; Scientific Production; Lattes Platform; Oasisbr; Open Access.

PALABRAS CLAVE

BrCris; Certificación de datos; Producción científica; Plataforma Lattes; Oasisbr; Acceso abierto.

1. Introduction

The Brazilian scientific production has demonstrated substantial growth in recent years (Sidone, Haddad & Mena-Chalco, 2017). However, it is crucial to emphasize that this production is not uniform, as the specificities of each disciplinary field contribute to both quantitative and qualitative heterogeneity.

The diversity of knowledge fields is a determining factor for the varied typification of scientific production outcomes (Borgman, Furne, 2002). Within each discipline, different types of contributions can be observed, ranging from publishing articles in conference proceedings and scientific journals to the production of Theses and Dissertations.

Therefore, it is important to highlight that this wide array of scientific expression reflects the creativity and capacity of Brazilian researchers to transcend conventional boundaries of scientific production (Mena-Chalco et al., 2014). These contributions not only strengthen the academic and scientific landscape of the country but also have the potential to positively impact society, driving progress and innovation across various domains.

In light of this landscape, initiatives have emerged to create systems that manage academic production in institutions, countries, or knowledge areas. These systems are referred to as Current Research Information Systems (CRIS), and their primary purpose is the integration of information from various databases (Schöpfel & Azeroual, 2021). The objective is to provide consolidated reports and data, enabling researchers to analyze scientific production in their respective countries or knowledge areas.

The CRIS system organizes and centralizes information about various aspects of the research process, including received funding and grants, ongoing research projects, involved researchers, research institutions, and utilized laboratories. Additionally, it encompasses research outcomes such as scientific articles, theses, dissertations, books, book chapters, patents, and scientific datasets (Sivertsen, 2019).

Through CRIS, it is possible to have a comprehensive and integrated view of all stages of the scientific process, allowing for better research management and monitoring. By consolidating all information into a single system, access to and retrieval of data are facilitated, promoting greater efficiency in searching for specific information. This integrated approach provided by CRIS is fundamental for enhancing communication and collaboration among the various actors involved in the scientific process. Moreover, the system also contributes to transparency and accountability, as all relevant information is available in an organized and accessible manner.

In this context, the conception of the BrCris System project (Pinto et al., 2021), which is the CRIS within the Brazilian Science context, dates back to 2014. Inspired by the model proposed by Portugal for a national CRIS, PTCRIS[1], the Brazilian Institute of Information in Science and Technology (Ibict) initiated a sequence of studies and inter-institutional partnerships for project execution. In 2020, a formal research project for the construction of BrCris was implemented. The aim is to provide technological tools aimed at furnishing consolidated data of Brazilian scientific production to the entire academic community.

BrCris aims to establish a unique model for organizing scientific information throughout the Brazilian research ecosystem (Segundo et al., 2022). By integrating data into a standardized and duly evaluated data repository, BrCris enables the certification of information from sources that have not yet been validated. This results in a more precise and comprehensive view of Brazilian scientific and technological production.

By centralizing and standardizing information, BrCris enables a more complete and reliable analysis of the scientific and technological landscape of the country. Moreover, the data certification process contributes to ensuring the quality and reliability of the provided information (Dias et al., 2023). Thus, BrCris plays a fundamental role in providing a realistic and up-to-date view of Brazil's scientific and technological production. This integrated and certified data approach strengthens strategic decision-making, public policy planning, identification of areas of excellence, and the promotion of collaboration among researchers and institutions.

The main objective of this study is to demonstrate how BrCris can be employed as a mechanism for certifying scientific data through the collection and integration of open sources. To illustrate this application, a case study involving the certification of theses and dissertations registered in the Lattes[2] Platform curricula will be conducted, utilizing records collected from the Brazilian Portal of Open Access Scientific Publications and Data, Oasisbr[3].

BrCris stands out as a tool capable of consolidating information from diverse sources, promoting data standardization and certification. In this context, the certification of theses and dissertations serves as a practical example of how BrCris can contribute to the quality and reliability of academic records. The case study will be conducted using curricula registered in the Lattes Platform, a widely used database in the Brazilian academic milieu (Lane, 2010). Records of the Theses and Dissertations were collected from Oasisbr, an

open source repository that aggregates these academic works (Campos, Sousa & Vilas Boas, 2020).

Through the integration of these two sources, **BrCris** will enable the verification and certification of data related to Theses and Dissertations. This certification process is essential to ensure the quality and reliability of academic information, as well as to reinforce the integrity of the research ecosystem. By utilizing **BrCris** as a certification mechanism, it is expected to attain a more precise and comprehensive view of academic production in Brazil. This will facilitate research analysis and evaluation, as well as the planning of policies and investments in the scientific field. In summary, **BrCris** proves to be a valuable tool for certifying scientific data, enhancing the reliability and quality of information. The case study involving the certification of Theses and Dissertations serves as a practical example of how **BrCris** can be applied to improve the management and analysis of academic production in Brazil.

Finally, in the era of open science (Vicente-Saez & Martinez-Fuentes, 2018), where accessibility and transparency of research data are paramount, the **BrCris** System stands out as a crucial asset for the international academic community. Aligned seamlessly with the principles of open science, **BrCris** not only centralizes and standardizes scientific information but also facilitates its certification. The global scientific community increasingly values initiatives that promote transparency, reproducibility, and responsible sharing of research outputs (Christensen, Freese & Miguel, 2019). By specifically addressing the certification of Theses and Dissertations within the Brazilian context, our study transcends academic intricacies, responding to a worldwide demand for reliable, certified data. This not only enhances academic credibility but also promotes cross-border collaboration and knowledge exchange. In a landscape where international cooperation is pivotal, the **BrCris** System contributes significantly to the broader discourse on open science practices, rendering our research not only academically pertinent but also globally relevant.

2. Case report

Data certification systems play a pivotal role in verifying the origin, accuracy, integrity, and reliability of datasets stored in various systems. These mechanisms are responsible for ensuring the authenticity of provided information and are capable of bolstering data trustworthiness (Batini & Scannapieco, 2006).

One method of certification involves self-declarative actions, in which the system itself attests to the accuracy of the data. However, for enhanced security and credibility, it is possible to enlist a "trusted third party" that validates this information. In this scenario, the self-declarative signature is replaced by

a certified signature, which adds value to the certification process.

The presence of a trusted third party plays a crucial role in data validation, as it acts as an impartial and reliable entity. This external validation provides security and veracity to the provided information, furnishing an additional layer of protection against potential manipulations or frauds.

Employing a data certification system with the presence of a trusted third party offers a means to mitigate risks associated with data authenticity and integrity. This approach fosters transparency and reliability of datasets, proving particularly pertinent in contexts where information veracity is paramount, such as in scientific, financial, and legal domains. The data model of **BrCris** comprises a set of entities and relationships, each possessing predefined identifiers and attributes. To facilitate the identification of attributes for each entity and their relationships, a descriptor-based approach is employed.

The descriptor functions as a tool that aids in the identification and manipulation of attributes and relationships within the data model. With the assistance of a routine developed specifically for this purpose, the model can readily incorporate all changes made directly to the descriptor.

This strategy provides an agile and flexible means of integrating new attributes and relationships into the data model, obviating the need for direct alterations to the model itself. Consequently, updates can be executed more efficiently, enabling swift and dynamic adaptation to the demands and evolutions of the research ecosystem.

Furthermore, the use of descriptors contributes to improved organization and management of attributes and relationships, rendering the data model more modular and scalable. This facilitates system maintenance and expansion, ensuring greater flexibility and adaptability to changes.

In the course of this investigation, a comprehensive evaluation of the preliminary certification model was executed, encompassing the seamless integration of the Lattes Platform with **Oasisbr**. The advancements achieved under the **BrCris** Project have facilitated the establishment of a sophisticated mechanism designed for the accurate identification of Theses and Dissertations declared within the academic formation and completed guidance segments of a designated curriculum enrolled in the Lattes Platform. This intricate process involves the careful cross-referencing of data with records aggregated by **Oasisbr**, ensuring a robust and reliable certification workflow. The technological developments within the **BrCris** framework have empowered the creation of an intelligent system capable of discerning and validating academic
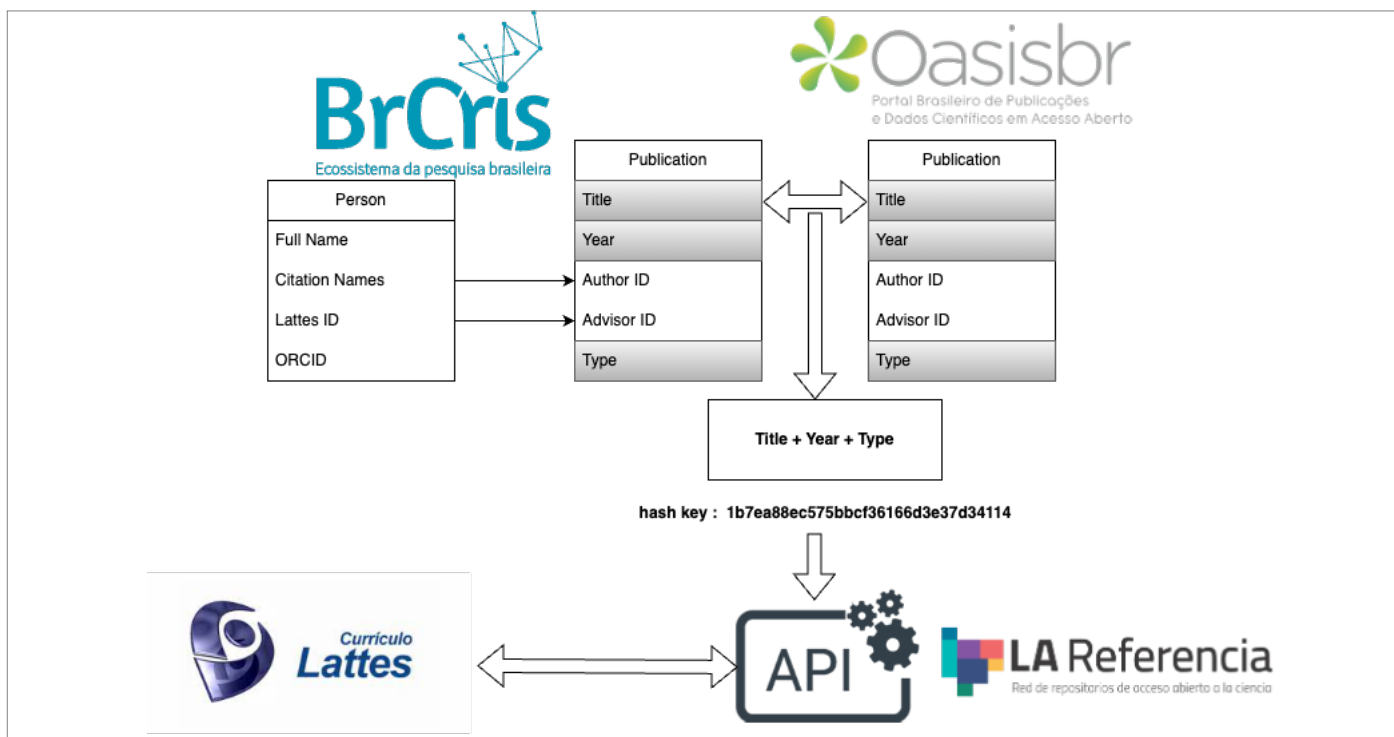
Figure 1. Certification Process of Theses and Dissertations. Source: The authors.

outputs, enriching the certification process for the benefit of researchers and the broader scientific community (Figure 1).

The entirety of the interlinking process between repositories strictly adheres to the identifier generation standard implemented by **BrCris**. In essence, this standardized procedure encompasses the transformation of the document title, considering both the publication year and type (Thesis or Dissertation). Subsequently, throughout the data transformation and linking process, validation is carried out by the **La Referencia** Platform, ensuring the reliability and accuracy of the interconnected datasets.

The **La Referencia** Platform, utilized by **BrCris** as a data integration mechanism, is responsible for data deduplication and, in the specific case of certification, for verifying the existence of a key generated in one dataset to link it to another if it is also present in the second dataset to be verified.

Therefore, the linking process between repositories utilizes **BrCris**' internal identifier generation standard, which considers the document title, publication year, and publication type. The data undergo validation by the **La Referencia** Platform, which performs deduplication and verifies the presence of keys in datasets to be verified. These steps are fundamental to ensure data consistency and integrity during the certification process.

Finally, upon discovering a matching key in both repositories, the identifier that includes the document's location in **Oasisbr** is transmitted through an API to the Lattes Platform. Following this, the Lattes Platform executes the certification process for the Thesis or Dissertation, complete with the issuance of

a certified document seal. This conclusive step ensures the authentication and integrity of the document, solidifying its status as a certified and reliable scholarly work within the framework of **BrCris**.

This certification step is essential for validating the authenticity and integrity of the document. Upon receiving the **Oasisbr** identifier, the Lattes Platform verifies the correspondence and confirms that the thesis or dissertation is duly registered and available in the Oasisbr repository. Based on this verification, the Lattes Platform can issue a seal certifying the document.

The certified document seal serves as a mark of authenticity and reliability, providing a trusted reference for the certified thesis or dissertation. This certification is fundamental for establishing the validity and credibility of scientific documents within the context of BrCris.

3. Discussion

In the context of this study, **Oasisbr** assumes the role of a "trusted third party" in the certification process, even in the absence of a previously assigned persistent identifier for the thesis or dissertation.

The entire certification process conducted is based on robust and validated computational strategies, which have been developed and refined through numerous prior studies and analyses. These strategies encompass the careful analysis of information self-declared by researchers, comparing it

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Orientador: 👁 Ursula Blattmann.
Bolsista do(a): Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, CAPES, Brasil.
Palavras-chave: Transferência e Acesso à informação; Fontes de Informação; Startups; Inovação; Fluxo da informação.

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Bolsista do(a): Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, CAPES, Brasil.

Figure 2. Excerpt from a Curriculum with Certified Thesis and Dissertation. Source: The authors.

with data present in repositories, digital libraries, and portals aggregated by **Oasisbr**.

Through this meticulous comparison, the consistency and veracity of the presented data are verified, aiming to establish a reliable correspondence between the information declared by the researcher and the information recorded in the repositories and aggregated sources. This process is fundamental to ensure the credibility and reliability of the certification conducted by **Oasisbr**.

Once certification is successfully completed, the **Oasisbr** certification seal is prominently displayed next to the titles of the Theses or Dissertations in the researcher's curriculum. This distinctive mark serves as proof of the quality and authenticity

of these works, providing a trusted reference for the scientific community and other stakeholders (Figure 2).

With the **Oasisbr** certification seal displayed alongside the titles of Theses and Dissertations in the curriculum, researchers have the opportunity to readily and straightforwardly obtain documentary proof of the stated degree. This seal lends credibility and authenticity to the work, offering a reliable means of accessing the corresponding document in Oasisbr (Figure 3).

The certificate can be obtained in two ways: automatically through the Lattes Platform or by the user's manual request. In the case of automatic issuance, the Lattes Platform integrates with **Oasisbr**, allowing the certificate to be generated and made available directly through the system. This streamlines the process for researchers, who can benefit from the speed

Fontes de Informação no Ecossistema de Startups de Florianópolis

Autor(a) principal:	PRISCILA MACHADO BORGES SENA
Data de Publicação:	2020
Tipo de documento:	Tese
Título da fonte:	Portal de Dados Abertos da CAPES

A biblioteca universitária na educação a distância: papel, características e desafios

Autor(a) principal:	Sena, Priscila Machado Borges
Data de Publicação:	2014
Tipo de documento:	Dissertação
Idioma:	por
Título da fonte:	Repositório Institucional da UFSC
Texto Completo:	https://repositorio.ufsc.br/xmlui/handle/123456789/129086
Resumo:	Dissertação (mestrado) - Universidade Federal de Santa Catarina, Centro de Ciências da Educação, Programa de Pós-Graduação em Ciência da Informação, Florianópolis, 2014.

Figure 3. Thesis and Dissertation Documents in Oasisbr. Source: The authors.

Figure 4. Access to Certified Documents in the Institutional Repository. Source: The authors.

and convenience of receiving the certificate without additional bureaucracy.

Alternatively, users can also manually request the certificate from **Oasisbr**. This option provides greater flexibility and control for the researcher, who can choose the appropriate time to request certification and track the entire issuance process.

Regardless of the chosen method, the certificate issued by **Oasisbr** is an official and recognized document that confirms the existence and validity of the Thesis or Dissertation. When accessing the document through the certification seal, tangible and verifiable proof of the declared degree can be obtained.

Accessing a Thesis or Dissertation through **Oasisbr** allows for quick and convenient retrieval of the document corresponding to the certified degree. This ease of access to the deposited document contributes to a swift and reliable experience, promoting the effective dissemination of academic knowledge (Figure 4).

Oasisbr plays a crucial role by centrally providing a repository that encompasses various knowledge domains. Through this platform, users can directly access certified Theses and Dissertations, obtaining valuable and relevant information for their research, studies, and academic references.

Furthermore, by facilitating access to deposited documents, **Oasisbr** promotes transparency and visibility of academic productions. Researchers, students, and other interested parties can rely on a trustworthy medium to locate and access these works, contributing to the dissemination of scientific knowledge and the advancement of research.

Through the advancements achieved within the scope of the **BrCris** Project, it was possible to develop an efficient mechanism to identify Theses and Dissertations present in the academic formation and completed guidance sections of the curricula registered in the Lattes Platform. These records were aggregated into the dataset provided by Oasisbr, making it a "trusted third party" in the certification process.

Within the Lattes Platform, which aggregates a vast number of academic curricula, there are approximately 1.1 million records of Theses and Dissertations. Among these records, about 65% (approximately 700,000) are already eligible for certification, demonstrating the significant potential of BrCris to certify a large number of Brazilian academic works. Additionally, another 10,000 Theses and Dissertations defended abroad have been identified to receive the certification seal.

The certification process offers several significant advantages. By certifying scientific works, guidance, participation in review panels, and other elements from self-declared sources, it is possible to ensure the truthfulness and authenticity of this information. This contributes to preventing the dissemination of false or inaccurate data, promoting greater reliability in academic production.

Certification plays a fundamental role in building the credibility and authority of researchers. When their work is certified, researchers gain support and recognition, both within the scientific community and in the eyes of academic institutions and other stakeholders in the field. The validation of data and academic achievements through certification reinforces the competence and seriousness of researchers, establishing a standard of quality and trust in their contributions to scientific knowledge.

4. Conclusions

The **BrCris**, Brazilian Scientific Research Information Ecosystem, stands out as an inclusive platform that not only possesses the capability to retrieve, certify, and visualize data and information pertaining to various entities engaged in Brazilian scientific research but also represents an ambitious project developed by the Brazilian Institute of Information in Science and Technology (IBICT) in collaboration with several other institutions. This system not only facilitates access to and analysis of technical-scientific data but also integrates information from funding agencies, scientific and technical databases, institutional repositories, government platforms, research infrastructure, and databases of theses and dissertations. It not only positions itself as a valuable contribution to the international research community but also serves as a testament to the collaborative efforts aimed at advancing scientific knowledge on a global scale.

Open science promotes collaboration, transparency at all stages of research, and the integration of science with society (Abadal, 2019). In this context, **BrCris** is aligned with this purpose. As mentioned earlier, **BrCris** is an initiative that collects and enriches data from open repositories and databases, representing a unique proposal worldwide, facilitating the creation of a Brazilian Overview of the Production and Activities of all its academic and scientific actors.

The importance of certification processes applied to Lattes Platform curricula cannot be overstated, as they are based on self-declared information. It is crucial to emphasize that a Thesis or Dissertation is only considered an official qualification document when its final version, with the necessary corrections suggested by the evaluators, is deposited in an official and publicly accessible repository. Certification plays a crucial role in ensuring the authenticity and validity of these documents, granting them recognition and support within the academic community.

Finally, the certification elucidated in our discourse delineates the procedural steps of validation and authentication, specifically executed through the collaborative integration of the Lattes Platform and Oasisbr. It is imperative to note that this certification framework is exclusive to the academic realm and does not encompass legal or judicial validation processes conducted by a court for Theses and Dissertations.

Endnotes

1 Brazilian Institute of Information in Science and Technology, PTCRIS: https://ptcris.pt

2 The Lattes Platform (https://lattes.cnpq.br/), introduced by the National Council for Scientific and Technological Development (CNPq), functions as a comprehensive repository for academic curricula from both public and private institutions. Acknowledged as a benchmark for assessment in Brazil, Lattes CVs provide a detailed record of the scientific, academic, and professional activities of registered researchers. Importantly, this platform serves as a valuable tool for retrospective analysis while also offering insights into the prospective landscape of the scientific community in the future.

3 Brazilian Portal of Open Access Scientific Publications and Data, Oasisbr: https://oasisbr.ibict.br

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