

# CUIDADO É FUNDAMENTAL

Escola de Enfermagem Alfredo Pinto – UNIRIO

RESEARCH

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## EXTENDED SCIENTIFIC PUBLICATIONS: AN INTEGRATIVE REVIEW

*Publicações científicas ampliadas: uma revisão integrativa**Publicaciones científicas extendidas: una revisión integradora***Andressa Aline Bernardo Bueno**<sup>1</sup> **Lícia Laura Craveiro de Souza Queiroz**<sup>2</sup> **Rosilene Alves Ferreira**<sup>3</sup> **Maria Simone de Menezes Alencar**<sup>4</sup> 

### ABSTRACT

**Objectives:** to investigate the state of the art of expanded scientific publications aimed at boosting science. **Method:** qualitative research of an integrative nature in the following databases: Web of Science, Library, Information Science and Technology Abstracts and Scopus via Portal Periodicals Capes, Dimensions, PLOS ONE, Reference Database of Journal Articles in Science of Information and Scientific Electronic Library Online in the period of June 2022. **Results:** eleven articles divided into two categories: characterization of expanded publications and support infrastructure for expanded publications. **Conclusion:** Despite being multivariate, expanded publications have peculiar characteristics that make them composite and dynamic digital objects with a better user experience. The articles point out that there is no support infrastructure on journal platforms and when found, it is simple and with few resources.

**DESCRIPTORS:** Open access publishing; Electronic publications; Scientific communication and diffusion; Nursing.

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## RESUMO

**Objetivo:** investigar o estado da arte das publicações científicas ampliadas voltadas para a dinamização da ciência. **Método:** pesquisa qualitativa de cunho integrativo nas seguintes bases de dados: Web of Science, Library, Information Science and Technology Abstracts e Scopus via Portal Periódicos Capes, Dimensions, PLOS ONE, Base de Dados Referencial de Artigos de Periódicos em Ciência da Informação e Scientific Electronic Library Online no período de junho de 2022. **Resultados:** onze artigos divididos em duas categorias: caracterização das publicações ampliadas e infraestrutura de suporte para publicações ampliadas. **Conclusão:** apesar de multivariadas, as publicações ampliadas possuem características peculiares que as tornam objetos digitais compostos e dinâmicos e com melhor experiência para o usuário. Os artigos apontam que não há infraestrutura de suporte nas plataformas de periódicos e quando encontrado, se apresenta simples e com poucos recursos. **DESCRITORES:** Publicação de acesso aberto; Publicações eletrônicas; Comunicação e divulgação científica; Enfermagem

## RESUMEN

**Objetivos:** investigar el estado del arte de las publicaciones científicas ampliadas destinadas al impulso de la ciencia. **Método:** investigación cualitativa de carácter integrador en las siguientes bases de datos: Web of Science, Library, Information Science and Technology Abstracts y Scopus vía Portal Periodicals Capes, Dimensions, PLOS ONE, Reference Database of Journal Articles in Science of Information y Scientific Electronic Library Online en el período de junio de 2022. **Resultados:** once artículos divididos en dos categorías: caracterización de publicaciones expandidas e infraestructura de soporte para publicaciones expandidas. **Conclusión:** a pesar de ser multivariadas, las publicaciones expandidas tienen características peculiares que las convierten en objetos digitales compuestos y dinámicos con una mejor experiencia de usuario. Los artículos señalan que no existe una infraestructura de apoyo en las plataformas de revistas y cuando se encuentra es sencilla y con pocos recursos.

**PALABRAS CLAVE:** Publicación de acceso abierto; Publicaciones electrónicas; Comunicación y divulgación científica; Enfermería.

## INTRODUCTION

Extended scientific publications, commonly Extended Publications (AP), are often perceived as those digital publications that include, in addition to the text itself, datasets, images, tables, processing workflows, software, links, and other devices.<sup>1</sup>

In this way, extended publications provide cooperation among researchers with connectivity, data sharing, and language convergence in digital repositories, allowing reuse of the dataset used in other research in the context of open science.<sup>2</sup>

The literature in information systems on extended publications indicates the need for agreement on the usual methodology and language, in order to allow comparison and analysis between studies, as well as with the results of the research conducted.<sup>3</sup>

Scholars report that the investment perpetrated in research has increasingly required that any results of studies be published and cited by funders in an effort to measure return and improve incentive strategies, and to compete for professional prominence and scientific awards.<sup>3</sup> Therefore, scholarly journals must have interlocking and trivial definitions to assist scientists in the use of various terminologies for classification, comparison, analysis, or merely discussion of solutions in the field.

Therefore, extended publications are an important way of disseminating science. They determine that scientific journals play a major role in the context of science communication, as

they derive three categories of information, such as research data, extra materials, and post-publication data.<sup>4</sup>

Extended publications have developed from studies on digital repositories in counterpoint to the usual publications. Their main characteristics are the ease of access to research sources and the intersection of information not yet available that is being produced. The Public Library Of Science (PLOS) platform is an example of AP, as it makes available several features of the extended publications.<sup>4</sup>

Within open science, access to information has been an important item, as it allows for enhanced publication features to add validity to presentation formats and enhance reader comprehension in recent years. Extended publication of scientific technology journals is common among major international publishers such as Springer, PLOS, Elsevier, Wiley, and many others.<sup>5</sup>

Information Science has done research on how journals have adopted enhanced characteristics, through complementary tools and solutions to allow better apprehension of the scientific article narrative, enabling the integration of scientific information, connecting content and other relevant data, and that, help to structure the academic publication more effectively.<sup>6</sup>

The objective of the article is to investigate the state of the art of extended scientific publications aimed at stimulating science. The study is justified because as far as is known, there are still no consistent, available, and sufficient studies on the subject, which has made it impossible to disseminate knowledge of extended scientific publications to individuals

and society. Thus, the research is relevant because the expanded scientific publications can enable access to knowledge in a plural and democratic way for all.

## METHODOLOGY

This is a qualitative integrative research, since there are not many studies on the subject. Thus, it was necessary to prepare an integrative review of the literature on the subject, because the method allows us to synthesize the knowledge sought in a systematic and rigorous way. The integrative review is concerned with the existing principles advocated by the research methodology.<sup>7</sup>

After defining the objective, the next step was to search and select articles using the keywords: 'enhanced publication', communication and 'editorial production' together with the Boolean operator AND in the following databases: Web of Science, Library, Information Science and Technology Abstracts (LISTA) and Scopus via Portal Periódicos Capes, Dimensions, PLOS ONE, Reference Database of Journal Articles in Information Science (Brapi) and Scientific Electronic Library Online (SciELO). The search fields used were title, abstract, keywords, or topic, when applicable.

Data collection occurred during the month of June 2022 performed by two independently paired reviewers, which resulted in 108 potential articles. These were submitted to the inclusion criteria, which were: articles available in full text, in Portuguese and English, whose title and abstract were related to the object of study, that portrayed the expanded publications, and with a time frame of 12 years, from 2010 to June 2022. Duplicate articles, those not available online or through the CAPES Portal, and other languages were excluded. Then, the results were evaluated and critically organized and interpreted, comparing them with the literature.

## RESULTS AND DISCUSSION

From the total selected, after reading the title and abstract, 11 articles were selected, according to chart 1:

Among the eleven articles selected, four are national and seven are international, being the year 2019 more evident, presented four articles and 2018 and 2015 presented two articles each.

In the analysis of the articles, two thematic axes emerged that contributed to the discussion of the data, namely: a) characterization of the extended publications with four articles;

and b) support infrastructure for the extended publications with seven articles.

a) Characterization of the publications extended with four articles

For this category, four articles were identified whose objective was to describe the characteristics of the extended publications, as shown in table 2.

**Chart 2** - Distribution of selected articles for the thematic axis characterization of publications extended with four articles. Rio de Janeiro, RJ, Brazil, 2022.

Authors	Objective	Methodologies	Main results
Avila E, Bomfá CR, 2021 <sup>4</sup>	Identify and present which features of enhanced publications can be used by digital scientific journals.	Qualitative, exploratory research in the Public Library of Science (PLOS) platform.	Characteristics of PAs: hypertextuality, multimodality, interactivity, memory, personalization, and ubiquity.
Fang Q, Zhan L, Peng W, 2019 <sup>5</sup>	Determine the degree of adoption of the enhanced publishing features.	It analyzed 472 science technology journals from China.	21% (102) adopted extended publication features, mostly simple, that did not depend on authors to provide supplemental content.
Curty RG, Delbianco NR, 2018 <sup>6</sup>	Describe the properties and identify which features are present in the selected journals	Analyzed eight Information Science journals from Brazil	Most of the resources and tools associated with the content are absent in the journals.
Bardi A, Manghi P, 2014 <sup>3</sup>	1) Introduce the terminology needed to describe and compare structural and semantic features of existing enhanced publication data models; 2) Propose a classification of enhanced publication information systems	-	It introduced common terminology and classification scheme. The literature offers a plethora of information systems designed to manage enhanced publications that meet scientific communication requirements.

Extended publications are digital publications that comprise a mandatory narrative part - research conducted - and more related parts that can be other publications, images, tables, workflows, datasets. It arises due to the limitations of publishing traditional scientific communication through PDF files, whether printed or online, and in the face of new demands from scientists.<sup>3</sup>

In an analysis carried out on the PLOS platform, seven defining characteristics were identified for the extended publications, as follows: 1) hypertextuality: it provides the reader with a non-linear and dynamic browsing experience where,

**Chart 1**- Stages of selection of articles in the databases. Rio de Janeiro, RJ, Brazil, 2022.

Articles	Web of Science	LISTA	Scopus	Dimensions	PLOS ONE	Brapi	SciELO	Total
Founded	15	21	41	29	1	1	-	108
Excluded	13	16	40	27	1	-	-	95
Selected	2	5	1	2	-	1	-	11

by means of available links, the reader is directed according to his/her search for information; 2) multimedia: it refers to the possibility of attaching to the main text photos, videos, and audios that complement and corroborate the textual information; 3) interactivity: establishes contact between user and editor and allows the former to send feedback; 4) instantaneity: evidence in real time new information; 5) memory: makes the collection available through database and its location through search engines; 6) customization: allows the reader to apply their preferences regarding the customization of the content, registration to receive information by e-mail and others; finally 7) ubiquity: suitability of the content for mobile devices. <sup>4</sup>

Despite the properties that an enhanced publication can assume and be advantageous to the reader - improving their experience with the published material - and to the publisher and author with greater visibility and citation potential, researchers analyzed 472 journals with high impact factor in science and technology in China and found that when the journals use the enhanced features (21%), they are simple and independent of the author's submission of material. It is noteworthy that 79% have not yet appropriated the new communicative models and point out as the main reason the lack of external incentive to send supplementary material. <sup>5</sup>

These results are corroborated with the investigation of analysis of eight Information Science journals in Brazil and found the absence of interactive features and non-compliance with accessibility for people with disabilities. These resources may not be suitable for all articles, however, there is a need to provide authors with the enhanced attributes and functionality. <sup>6</sup>

In this regard, nine information systems for enhanced publication data model are highlighted, they are: D4Science, SciVee, PLOS Neglected Tropical Diseases, Veteran Tapes project, Utopia Documents, Rich Internet Publications (RIP), SOLE, Article of the Future, and Bookshelf. These platforms allow subparts to be connected to the narrative text, utilize web resources for enriched text, and include dynamic content within the text. <sup>3</sup>

b) Support infrastructure for extended publications with seven articles.

For this category, seven articles were identified whose purpose was to describe or suggest support infrastructures for extended publications, as shown in Table 3:

**Chart 3** - Distribution of articles selected for the thematic axis of support infrastructure for extended publications. Rio de Janeiro, RJ, Brazil, 2022 (continued).

Authors	Objective	Methodologies	Main results
Torino E, Vidotti SA, Alves RC, Santos PL, 2019 <sup>8</sup>	Discutir como enlaçar diferentes objetos digitais no contexto da publicação científica ampliada.	Pesquisa bibliográfica para embasamento teórico-conceitual e da pesquisa exploratória para compreensão do cenário abordado.	It presents the Current Research Information System (CRIS) as a suitable suitable for an informational ecology capable of linking objects and their agents.

Arraiza PM, Gonzalez PRVA, Vidotti SABG, 2019 <sup>9</sup>	Establish recommendations for integrating extended publications into trusted digital repositories	Qualitative research with exploratory character that analyzes the extended publications and literature, as well as current initiatives for archiving research objects in repositories. research objects	A series of recommendations and implementation methods are proposed for the integration of extended publications into trusted digital repositories.
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**Chart 3** - Distribution of selected articles for the thematic axis of support infrastructure for extended publications. Rio de Janeiro, RJ, Brazil, 2022 (conclusion)

Authors	Objective	Methodologies	Main results
Santos DB dos, Rockembach M, 2018 <sup>2</sup>	Propose an integration landscape between research data repositories and scientific publications based on the extended publications model	Three phases: 1) literature review of the area; 2) identification of data repositories from the re3data.org directory; 3) inspection of the interfaces of the selected repositories	Growing need to adopt an infrastructure compatible with extended publishing, making it important to use requirements for the interfaces to research data repositories
Bardi A, Manghi P, 2015 <sup>1</sup>	-	-	Enhanced Publication Information Systems (EPISs) are information systems designed to manage EPs in specific application domains. Currently, no framework supporting the realization of EPISs is known.
Bardi A, Manghi P, 2014 <sup>3</sup>	-	-	Introduces the notion of Enhanced Publication Management Systems that support the realization of EP
Breure L, 2014 <sup>10</sup>	-	-	Rich Internet Publication (RIP) is an interactive interactive multimedia publication is used primarily as a "showcase" for publishing supplementary material that could not otherwise be made available
Doorenbosch P, Sierman B, 2010 <sup>11</sup>	-	-	Addresses aspects of institutional repositories, long-term preservation, and scholarly publishing

To enable the author to manage and share his data and the user to read it in accordance with his areas of interest in a non-linear path, an infrastructure is necessary. In this sense, the Current Research Information System (CRIS) stands out as a platform for managing the research life cycle, from conception to completion using technology to optimize administrative processes. <sup>8</sup>

Alternatively, some digital repositories of institutions already have as final product digital publications with data added to the textual part, so they are suitable and reliable for preservation through their organization and infrastructure, however, it is not enough to store all the files, comes the commitment to preserve, that is, make them accessible in the long term. The costs of such preservation can pose the need to select information that is important today, without knowing what it will be like in the future.<sup>9,11</sup>

Researchers examined 136 data repositories registered in the re3data.org directory for the existence of 16 requirements to consider them as extended publication. They found that repositories with usability, pleasant, effective, and efficient interfaces were the repositories that integrated most of the requirements of extended publishing, generating data retrieval in less time and complete results.<sup>2</sup>

## CONCLUDING REMARKS

In this work, we sought to investigate the state of the art of extended scientific publications aimed at the dynamization of science. It was observed a reduced number of articles on the theme in question, despite the advances in the field of open science, making the dissemination of knowledge of scientific publications to individuals and society unfeasible.

There is a need for improvement and advancement in the improvement of open science on extended publications, with incentives for articles that seek the democratization of publications and dissemination of information.

The limitations found in this study, such as the number of articles available, may be reviewed in the future if there is more access to research on extended publications.

Despite being multivariate, the extended publications have peculiar characteristics that make them composite and dynamic digital objects with better user experience. The existence of supplementary material next to the narrative part is an advance in relation to the limitations of traditional publications, but there is a need to submit information in other formats for further data integration through links.

The articles point out that there is no support infrastructure in the journal platforms and when it is found, it is presented with few resources and in a simple way. Nevertheless, in the literature it is possible to find numerous possibilities of management systems for extended publications.

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