

## Strategies for an exploratory research structured in university extension project portfolios



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### Carla Campos

Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro – Rio de Janeiro (RJ) – Brazil. Industrial Designer, Graphic Division of the Federal University of Rio de Janeiro (DG/UFRJ). Master in Education, Management and Dissemination in Biosciences, Institute of Medical Biochemistry (IBqM/UFRJ). Specialist in Graphic Representation Techniques, School of Fine Arts (EBA/UFRJ).  
LATTES: <http://lattes.cnpq.br/1778142299768160>  
ORCID: <https://orcid.org/0000-0002-0124-9292>  
E-mail: [carlaaldrin@hotmail.com](mailto:carlaaldrin@hotmail.com)

### Elenice Correa-Gillieron

Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro – Rio de Janeiro (RJ) – Brazil. Associate professor, advisor in the Professional Master's Degree in Education, Management and Dissemination in Biosciences, Institute of Medical Biochemistry (IBqM/UFRJ). PhD in Sciences, Neurosciences, Carlos Chagas Filho Institute of Biophysics (IBCCF/UFRJ). Master of Science, Paulo Alcantara Gomes Institute of Biology, State

University of Rio de Janeiro (IBRAG/UERJ). Specialist in Nuclear Biosciences (UERJ).  
LATTES: <http://lattes.cnpq.br/7821360970295429>  
ORCID: <https://orcid.org/0000-0002-4608-1390>  
E-mail: [corgillieron@ufrj.br](mailto:corgillieron@ufrj.br)

### ABSTRACT

The study was relevant to establish scientific methodological parameters for conducting the Retrospective Exploratory Research (PEX) (2000-2020). PEX sought portfolios of extension projects and their possible types so that the references found could assist in the creation of a portfolio for the university extension project Museu 3D. A tree of keywords with multicriteria connectors and filters was elaborated as structural procedures, according to each search tool. The results, represented by the Venn-Euler diagrams, showed that although the portfolio is widely used in several areas and has an expressive bibliography, references with portfolios related to extension projects are scarce (only seven).

**Keywords:** Bibliographic research, Exploratory research, Extension Project Portfolio, Structured procedures.

## 1 INTRODUCTION

Portfolios are instruments created to present work, results, qualifications, experiences, skills and give greater visibility to products in different areas. In the area of design and advertising serve to expose innovative ideas for various segments (TAYLOR, 2013) in addition to presenting companies and customers a folder of advertising campaigns. In the business and finance area, the portfolio prioritizes "diluting the total risk of the investment" (ESPÍRITO SANTO, 2009) by putting the allocation of resources to the best projects (COOPER, 2015). In education it can serve as an evaluative instrument, a stimulating and reflective pedagogical practice among students and teachers, serving to organize, discuss works, etc. and showing how the construction of knowledge took place (TINOCO, 2012), (MORÁN, 2017); in the sciences, portfolios provide indicators for decision making, ensuring the completion of projects according to the established planning (MOREIRA, 2018).



In the case of the portfolio for the 3D Museum Extension Project (pM3D), active in the socio-educational area, a broad bibliographic research was made, called Exploratory Research (PEx) (GIL, 2002), commonly used when little is known about a subject and through it the first contact is made with the situation to be researched. According to Creswell (2007), a PEx "is very useful when the researcher does not know all the variables to be examined" and when the subject is little addressed. With PEx, the researcher explores and approaches what is being investigated, before defining the need for the procedures employed, whether experimental or not (BREVIÁRIO, 2020). Considering the complexity of the pM3D project mentioned, PEx seemed the most appropriate type of research.

This article addresses the parameters used for the PEx carried out, using the portfolio theme focused on the academic area of university extension, in the impasse of choosing the most appropriate articles to collaborate with the creation and theoretical argumentation about the importance of a portfolio for pM3D, a project adept to maker culture (SILVA; CORREA-GILLIERON, 2020; FIELDS, 2021). The project worked in the period of PEx, with a special target audience (students, including those with special needs, teachers and guardians) in schools, hospitals, science fairs, etc., always with the mission of meeting the yearnings of society. The pM3D was the subject of several dissertations (GONÇALVES, 2015; DE OLIVEIRA, 2019; Smith, 2019; CAMPOS, 2021) including the latter, discussed the creation of a portfolio for pM3D and used the PEx reported here for the broad sample survey on portfolios and portfolios for extension projects.

## **2 METHODOLOGICAL PROCEDURES**

### **2.1 THE PROBLEM QUESTION**

The problem question that motivated the creation of a portfolio for a university extension project (CAMPOS, 2021) referred to whether there were portfolios of extension projects and how they would be. Armed with this information, a modern, flexible and versatile portfolio for pM3D would be created, which even after a long time of work (2008 to 2020) did not have any portfolio. For this purpose it would be necessary a broad bibliographical research, as it happens in an exploratory research (PEx) (GIL, 2002).

## **3 THE DEFINITIONS AND STRATEGIES OF THE EXPLORATORY RESEARCH (PEX) CARRIED OUT**

### **3.1 THE PERIOD AND THE SEARCH ENGINES**

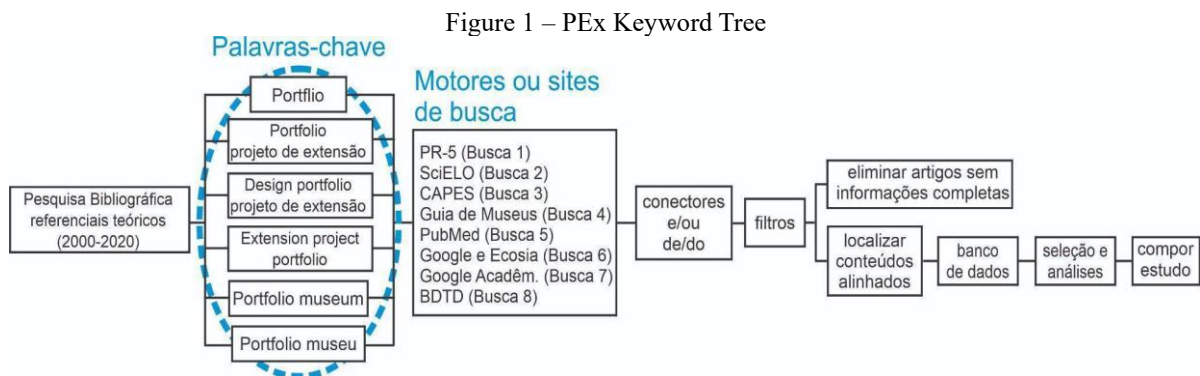
The initial parameters of PEx were: (a) to choose the search engines (or sites); (b) establish a comprehensive search period (2000 to 2020), parameters thought before making a data collection in a scientific work, being strategies defined by the researcher to establish a bibliographical research capable of facilitating the identification of the main articles on the subject, amid an enormous amount



of possibilities that permeate the world scientific production (TREINTA et al, 2014).

### 3.2 THE KEYWORD TREE AND CONNECTORS (OR BOOLEAN OPERATORS) EMPLOYED IN PEX.

A keyword tree (APC) was created (ANDRADE; FARIAS FILHO, 2014; TREINTA et al, 2014) to specify as clearly as possible the elements for PEx. The APC was structured (FIG. 1) by defining the keywords (or terms), the search engines, the period, the specific connectors and the initial filters for the PEx. The term portfolio (spelling in English) was chosen due to its common use in the area of Design, the field where the graphic design for the pM3D portfolio was created (CAMPOS, 2021). The terms "museum" and "museum" were used due to the pM3D having in its beginning, museological characteristics<sup>1</sup> (CORREA-GILLIERON, E.M.; CHAGAS, A., 2014) in addition to the socio-educational, technical and scientific nature. APC terms could be used singly or together, as in a key phrase.



Source: Elaboration of the authors. Keywords used: Portfolio. Extension project. Design. Extension Project. Portfolio museum. Museum portfolio. Search engines: Pró-Reitoria de Extensão UFRJ (PR-5), SciELO, Periódicos CAPES, Guia dos Museus Brasileiros, PubMed, Google, Ecósia, Google Scholar and Biblioteca Digital de Teses e Dissertações (BDTD). Filters: see items 2.4 and 2.5.

We used the AND/E connector that implies a restrictive search, that is, combines the search terms so that each result contains all the keywords; and the OR/OU connector that characterizes an open search, that is, the combination of terms so that each result has at least one of the keywords, in the same document or not (TREINTA et al, 2014). In some cases, the preposition DE was used, establishing a subordinate relationship between words (FIG. 1). For Treinta et al (2014), the connectors (and sometimes even their position) within the APC should be a research strategy, which was done in the present work.

<sup>1</sup> Law No. 11,904 of January 14, 2009, in Chapter 1, Art. 1: "Museums are considered non-profit institutions that conserve, investigate, communicate, interpret and exhibit, for the purposes of preservation, study, research, education, contemplation and tourism, sets and collections of historical, artistic, scientific, technical or any other cultural nature, open to the public, at the service of society and its development." Available at: [http://www.planalto.gov.br/ccivil\\_03/\\_Ato2007-2010/2009/Lei/L11904.htm](http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2009/Lei/L11904.htm)



### 3.3 SEARCH ENGINES AND SELECTION AND INITIAL ANALYSIS OF ARTICLES

In each site or search engine used (Chart 1), two initial filters were established to reduce the number of articles found: (a) 1-M3D filter, to eliminate articles that did not have complete information for the purposes of the study; (b) 2-M3D filter, aimed at locating in each article (especially the classics) everything that was aligned with the purpose of the study, including its references. After applying these filters, an analysis of the articles found was made, as indicated in the literature (TRAINA; TRAINA Jr., 2009): at first, read the title and abstract of the article; then read the conclusions, and this will give a good idea about the relevance of the article; after reading the introduction, and only then deciding if the article is within the desired scope.

Table 1 – Search engines (or engines) used in PEx

Quest	Description of search engines (or engines)
Search 1	PR5/UFRJ - Site of the Pro-Rectorate of Extension of UFRJ
Search 2	SciELO - Online Scientific Electronic Library that covers a selected collection of Brazilian scientific journals.
Search 3	Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) - It is a virtual library that gathers and makes available the best of scientific production in Brazil in addition to the international one.
Search 4	Guide to the Brazilian Museums of the Brazilian Institute of Museums
Search 5	PubMed - Biomedical literature with journals of biological, biomedical and medical sciences, online books. Site developed and maintained by the United States National Library of Medicine.
Search 6	Google and Ecosia Sites - Google is a multinational online services and software company in the United States, considered the most visited website in the world. Ecosia (Google's competitor), is a search engine of German origin that aims to convert 50% of its profits obtained from each search made, to the planting of trees.
Search 7	Google Scholar or Google Scholar - Google search tool that allows you to search in academic papers, school literature, university journals and assorted articles, with numerous of them in Portuguese.
Search 8	BDTD - Brazilian Digital Library of Theses and Dissertations that integrates the information systems of theses and dissertations existing in teaching and research institutions in Brazil and also stimulates the registration and publication of theses and dissertations in electronic media.

Source: Elaboration of the authors

### 3.4 THE MULTICRITERIA SYSTEM AND ARCHIVING OF ARTICLES IN A DATABASE

A multicriteria system was developed for each search engine in order to refine the PEx. This system did not use the usual rules and software (TREINTA et al, 2014), but established filters (specific filters: F1, F2 etc.) that in the search engines themselves, could make the refinement in the main PEx generating what were called search orders (Tables 1, 2, 3, 4 and 5), which varied in each search engine as they combined the keywords and connectors, changing the number of articles found. The articles



found were saved in a main folder called "Bibliographies for Project" (an updatable database, with subfolders sorted by subject). Saved in this folder was also the file "Bibliographies for Writing", a complete list of the bibliographic references found (authors, titles, year, website and dates of accesses), a facilitator to list the bibliographical references at the end of the PEx.

### 3.5 THE MATHEMATICAL REPRESENTATION OF THE RESULTS

To facilitate the observation of the universe of results found and the visualization of the results in common in more than one search (intersection), these were represented by schematics of sets (or diagrams). Each set has a color and represents a universe of elements, in this case the results, as shown in FIG. 2, 3, 4, 5 and 6 that express the relationships between the elements, discussed below. It can be considered that these schemes have similar characteristics to Euler (or Venn-Euler) diagrams, since they consist of simple closed curves drawn in the plane, which intersect allowing infinite intersections (RUSKEY; Weston, 2005).

## 4 DEVELOPMENT, RESULTS OBTAINED AND DISCUSSION

The development of PEx followed the APC, where according to Oribe (2004), a keyword tree (APC) is a way to identify the causes of a problem and serve to segment tasks and actions of a goal to be achieved. The APC created for PEx (FIG. 1) defined the keywords, search engines, period, specific connectors and initial filters that quickly guided the PEx steps. The results expressed in the chosen search engines were:

**Search 1:** Site of the Pro-Rectorate of Extension<sup>2</sup> (PR5/UFRJ): In it the search is made by fields: (Categories), (Contacts), (Articles), (News Source), (Weblinks) and the keywords enter as: (All words), (Any word), (Exact phrase); in the latter field, the preposition "DE" was used as a connector. The site does not allow the use of multicriteria; therefore, there were no search orders. Until the date of PEx, the results did not show bibliographic references related to the extension project portfolio and as the site is proper to the extension of UFRJ, the absence of results reinforced the objective of creating a portfolio for pM3D.

**Search 2:** SciELO (Scientific Electronic Library On-line) Website: Covers a selected collection of Brazilian scientific journals, among other open access journals from a network of partner countries. In this site, the refinement of PEx generated eleven search orders (TAB. 1), the filtering used Filters 1, 2 and 3 (F1, F2, F3). In orders 1 and 2, with only the term portfolio and F1 and F2, many articles were found (APPENDIX 1), but without direct correlation with extension project portfolio. A new

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<sup>2</sup> Available in: <https://xn--extenso-2wa.ufrj.br/index.php/component/search/?searchword=portfolio%20design%20extensao&searchphrase=all&Itemid=101>



refinement was made with the inclusion of keywords, AND connector and repetition of F2 (TAB. 1), generating order 3, with a significant decrease in articles (n=2). Articles repeated in the same order were considered only once (orders 3 and 5 were the only ones without repetition of articles). The articles in order 3 dealt with portfolios only in relation to business management and public policies, not contributing to the extension project portfolio.

Table 1 – Search in SciELO (Search 2)

Order	Keywords and Connectors	Filters	Thematic areas	Findings	Appendix
1	(portfolio)	F1	---	515	1
2	(portfolio)	F2	All SciELO	481	1
3	(portfolio) AND (extension project)	F2	All SciELO	2	1
4	(portfolio) AND (extension project) OR (design)	F2	All SciELO	481	1
5	(portfolio) OR (extension project) AND (design)	F2	All SciELO	8	2
6	(portfolio) AND (extension project) AND (design)	F2	All SciELO	0	-
7	(portfolio) AND (design)	F2	All SciELO	34	1
8	(design) AND (portfolio)	F3	WoS 1, 2, 3, 4, 5, 6	7	1
9	(portfolio) AND (extension project) OR (design)	F3	WoS 1, 2, 3, 4, 5, 6	98	1
10	(portfolio AND museum)	F2	All SciELO	0	-
11	(museum portfolio)	F2	All SciELO	0	-

Source: Elaboration of the authors. Filter 1 (F1): Language and period (Portuguese or English + 2000-2020); Filter 2 (F2) = F1 + fields (collection, journals, type of literature = all); (F3) = F1 + F2 + six thematic areas (WoS): 1. Education and educational research; 2. Public, environmental and occupational health; 3. Health sciences and services; 4. Health policies and services; 5. Biology; 6. Medicine, general and internal.

The inclusion of one more term (design) and a connector (OR) (TAB.1) with F2, generated order 4, which restored the number of articles (n=481) to that obtained in order 2 (APPENDIX 1). In order 4, an article stood out because it involved the triad teaching-research and extension and brought an electronic portfolio called "Moodle-learn" (SILVA et al, 2012), made by students in an extension project. However, only project forms were made available and not the portfolio itself, with no use for pM3D. Orders 5 and 6, with the same terms as 4, but with inversion of the position of the connectors, showed n=8 and n=0 articles, respectively. Order 5 (APPENDIX 2) did not contribute to the extension project portfolio, since most of the articles were about project management (BEKKER; MASHABA, 2018). Order 6 as well as orders 10 and 11 had n=0 and are not discussed.

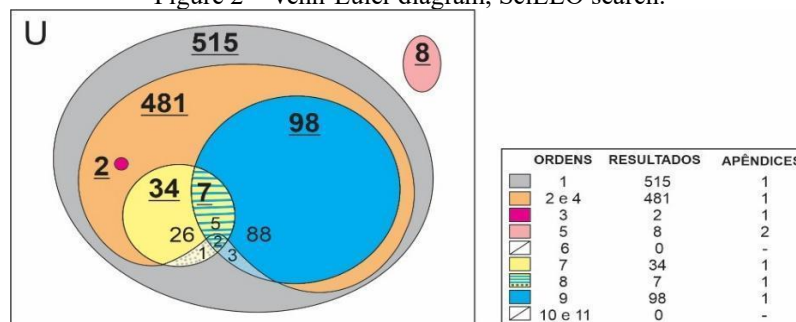
Orders 7 (n=34) and 8 (n=7) even used the restrictive connector AND and equal terms; but inverted, and different filters (F2 and F3) (TAB.1, see legend), decreasing the "n" of articles in relation to order 4, especially order 8, showing the influence of keyword inversion and area filtering in a PEx. In order 9 (n=98), which follows the same criteria as order 4, the significant decrease in articles (n=98)



is also due to filtering by area (F3). In this order, 23 articles were repeated; therefore only 75 were analyzed. The articles themselves (in orders 7, 8 and 9) did not bring effective contributions to the portfolio/extension project theme, as they were very diverse (APPENDICES 1 and 2).

The PEx in SciELO (FIG. 2) and in the other sites was graphically represented by Venn-Euler diagrams (or set schemes). In general, this type of diagram serves to group results with similar characteristics and show the different relationships between the sets and their elements (MARTINS, 2014). In PEx, each result was represented by a color and signified a set or search order (e.g., {1} = order 1). This diagram was adapted to the results of the PEx, because it was not necessary to show all the relations, only the specific ones of each search, which simplified the mathematical representation for the universe of articles found. In FIG. 2 there is intersection  $\cap$  (between sets, i.e. articles common to two or more orders, and pertinence relation (being element of) between distinct sets; thus, an order may be contained (in another order,  $\subset$ ) or an order may contain (elements of another order  $\supset$ ). As the {2} and {4} orders were equal (n=481, equal articles) the {4} most comprehensive in terms and connectors, was defined as the base listing in the SciELO search.

Figure 2 – Venn-Euler diagram, SciELO search.



Source: Elaboration of the authors. (U) Universe Set; {1} = gray set, n = 515; {2} = {4} = orange set, n = 481; {3} = pink set, n = 2; {5} = pink set, n = 8; {7} = yellow set, n = 34; {8} = blue and yellow hatched set, n = 7; {9} = blue set, n = 98; {1}  $\supset$  {3}, {4}, {7}, {8}, {9}; {3}  $\subset$  {4}; {7}  $\cap$  {9} = {8}; {8}  $\subset$  {7} e {9};  $\square$  = no appendix was made.

Although SciELO is easy to use and has a large collection as a digital library, the immense work of PEx carried out on the site did not present expressive results for the construction of the pM3D portfolio, which strengthened the hypothesis of actually having few bibliographies on the portfolio/extension project theme. The results showed the importance of the type and position of the connector in a PEx (orders 4, 5 and 6), as well as the use of filter by area (orders 8 and 9) to reduce the number of articles found.

**Search 3:** Site Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). In this, the keywords were associated with the filters: F4, F5, F5A, F6, F7 and restrictive (AND) (APPENDICES 3, 4 and 5) or comprehensive (OR) connectors, being obtained nine orders (TABLE 2). On this site, "portfolio" was usually first (in the title), except in orders 5, 6, and 9. The use of "portfolio" alone (TAB. 2) generated a large number of articles (n=11,269, order 1)



collaborating to show a vast literature on the portfolio theme (no appendix was made). The refinement used key phrases or new term in site-specific field and AND or OR OR connectors, generating orders 2 through 9. The decrease in the number of articles was significant from order 2 to 6; and less expressive of the order 7 to 9 with OR connector.

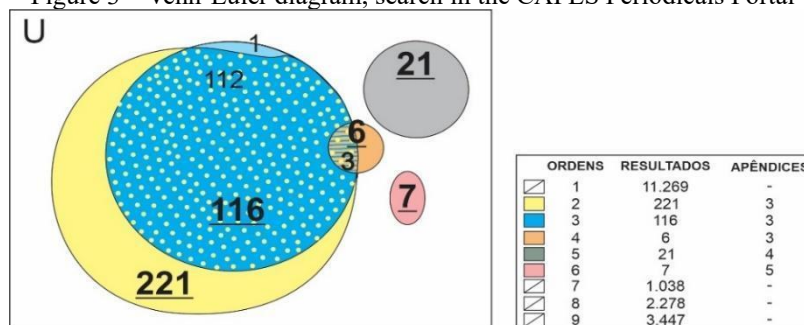
Table 2 – Search in CAPES Journals (Search 3)

Order	Keywords and Connectors	Filters	Results	Appendix
1	(portfolio) (in the title)	F4, F5, F6, F7	11.269	-
2	(portfolio) (no título) AND (extension project) (qq local)	F4, F5, F6, F7	221	3
3	(portfolio) (no título) AND (extension project design) (qq local)	F4, F5, F6, F7	116	3
4	(portfolio design) (no título) AND (extension project) (qq local)	F4, F5, F6, F7	6	3
5	(design portfolio) (qq local) AND (projeto extensão) (qq local)	F4, F5, F6, F7	21	4
6	(portfolio) AND (museum) (qq local)	F4, F5A, F6, F7	7	5
7	(portfolio) (no título) OR (extension project design) (qq local)	F4, F5A, F6, F7	1.038	-
8	(portfolio design) (no título) OR (extension project) (qq local)	F4, F5A, F6, F7	2.278	-
9	(design portfolio) (QQ Local) OR (extension project) (local qq)	F4, F5A, F6, F7	3.447	-

Source: Elaboration of the authors. (qq local = anywhere); Filter 4 (F4) = Period 2000-2020 and Type of material: Articles; (F5) = Language: English; (F5A) = English and Portuguese; (F6) = Peer-reviewed journal; (F7) = Thematic areas: Arts + Humanity, Sciences, Social Sciences, Nursing and Medicine.

Although this virtual library brings together the best of scientific production in Brazil besides the international one, the analysis of the articles obtained did not show anything specific to extension project portfolios. The references found were from areas very different from the purpose of the PEx, even with the inversion of the key phrases or insertion of a new term (orders 3, 4, 5, 6) (APPENDICES 3, 4, 5).

Figure 3 – Venn-Euler diagram, search in the CAPES Periodicals Portal



Source: Elaboration of the authors. {1} = U, n = 11,269; {2} = yellow set, n = 221; {3} = blue set, n = 116; {4} = orange set, n = 6; {5} = gray set, n = 21, {6} = pink set, n = 7; {3} ⊂ {2}; {4} ∩ {2} ∩ {3}; {7}, {8}, {9} ⊂ U. □ = no appendix was made.





The diagram of FIG. 3 expresses the results for the CAPES website, showing the relationship of pertinence to order 2, of the vast majority of articles of order 3 (except 1), as well as articles in common (n=3) between orders 2, 3 and 4. As orders 7, 8 and 9 had many articles that could interfere with the results, the strategy of choosing 10 articles from each of these orders for analysis was used; and these 30 articles showed that "portfolio" was related to different areas of the purpose of the PEx, and a few that pointed to an extension project, only described actions of the university extension. Therefore, demonstrably even with a comprehensive connector, there was no contribution to the purpose of PEx.

**Search 4:** Site Guide of the Brazilian Museums of the Brazilian Institute of Museums<sup>3</sup>: Register of Brazilian museums (with about 3,118 museums published). The PEx on this site has not been refined; focused on 23 virtual museums, of which only 13 sites opened, being analyzed. The Guide did not deal specifically with portfolio/extension project; but it was an advantageous PEx, because some museums (e.g. virtual museum of Rio Grande, virtual museum <sup>4</sup>Guido Viaro and virtual museum<sup>5</sup> of science and technology of the University of Brasilia<sup>6</sup>) brought ideas that contributed to the creation of the pM3D portfolio, highlighting: richness and organization of photographs by categories, links to interactive images, objectivity of information with little textual mass, quality of the captions, good resolution of the images.

**Search 5:** PubMed Website: Biomedical literature with journals of biological sciences, biomedical, medical and online books. In PubMed, PEx generated 11 search orders. The term portfolio used alone (orders 1 and 2) and with F8 and F9 (TABLE 3) generated many articles (n=5,814 and n=2,375, respectively). The insertion of a key phrase and comprehensive connector (order 3) kept this number high. With the same terms and filter (order 4), a restrictive connector radically decreased this result (APPENDIX 6). Order 5, with the addition of one more keyword and use of the two connectors, became unfeasible for analysis (n=614,619), unless the connectors were inverted (order 6, n=960) or only the restrictive connector was used (order 7, n=0). The results showed the importance in this site, of the choice and placement of connectors in PEx, especially when you have more than one word or key phrase (which did not seem appropriate). When only two keywords (regardless of position) were used with the same restrictive connector (orders 8 and 9), filtering (F8A and F9) (TAB 3) was significant to change the number of articles.

In orders 8 and 9, a selection of the first 50 articles showed (with F9) identical articles (n=569), demonstrating that it did not matter to change the order of the keywords, what made some selection

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<sup>3</sup>Available in: <https://www.gov.br/museus/pt-br/centrais-de-conteudo/publicacoes/guias-e-manuais/guia-dos-museus-brasileiros/view>

<sup>4</sup> Available at: <http://www.riograndeemfotos.fot.br/museuvirtual/>

<sup>5</sup> Available in: <http://museuguidoviaro.com.br/>

<sup>6</sup> Available in: <http://www.museuvirtual.unb.br/>



was the use of the F8A filter. However, no articles addressed the extension project portfolio, and they are not useful to PEx. The introduction of a single differentiated sentence (orders 10 and 11) with the same F9, generated an identical reduction in the number of articles (n=5), even with inversion in the sentence (TAB. 3), but no contribution to the purpose of PEx (CAMPBELL et al., 2020; McGENITY et al, 2020).

Table 3 – PubMed Search (Search 5)

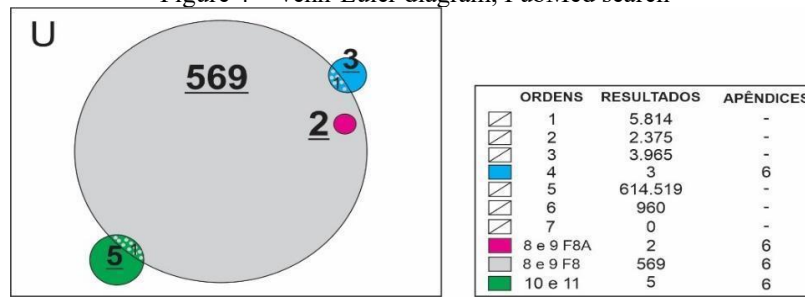
Order	Keywords and Connectors	Filters	Thematic area	Findings	Appendix
1	(portfolio)	F8	Biomedical Sciences	5.814	-
2	(portfolio)	F9	Biomedical Sciences	2.375	-
3	(portfolio) OR (extension project)	F9	Biomedical Sciences	3.965	-
4	(portfolio) AND (extension project)	F9	Biomedical Sciences	3	6
5	(portfolio) AND (extension project) OR (design)	F9	Biomedical Sciences	614.519	-
6	(portfolio) OR (extension project) AND (design)	F9	Biomedical Sciences	960	-
7	(portfolio) AND (extension project) AND (design)	F9	Biomedical Sciences	0	-
8	(portfolio) AND (design)	<u>F8A</u>	Biomedical Sciences	2	6
8	(portfolio) AND (design)	<u>F9</u>	Biomedical Sciences	<u>569</u>	6
9	(design) AND (portfolio)	<u>F8A</u>	Biomedical Sciences	2	6
9	(design) AND (portfolio)	<u>F9</u>	Biomedical Sciences	<u>569</u>	6
10	(portfolio museum)	F9	Biomedical Sciences	5	6
11	(museum portfolio)	F9	Biomedical Sciences	5	6

Source: Elaboration of the authors. Filter 8 (F8) = English + period: 2000-2020; Filter 8A (F8A) = Portuguese + period: 2000-2020 + addition of the term "free full text"; F9 = F8 + "free full text".

Figure 4 shows the Venn-Euler diagram for the PubMed results. Due to the large number of articles found, PEx analyzed in detail only some orders, and it is seen that some articles of orders 4, 8 and 9F8A, 10 and 11 (APPENDIX 6) are also in order 8 and 9 F8.



Figure 4 – Venn-Euler diagram, PubMed search



Source: Elaboration of the authors. (U) Universe Set;  $U = \{5\}$  ;  $\{4\}$  = blue set,  $n = 3$ ;  $\{8\}$  and  $\{9\}$  with F8 gray set,  $n=569$ ;  $\{8\}$  and  $\{9\}$  with F8A = set Pink ;  $\{10\}$  and  $\{11\}$  = green set,  $n = 5$ ;  $\{4\} \cap \{8\} \cap \{9\} F8 = 1$ ;  $\{5\} \cap \{8\} \cap \{9\} F8 = 1$ ;  $\{8\} \cap \{9\} F8A \subset \{8\} \cap \{9\} F8$ ;  = no appendix was made.

The results in PubMed showed that the literature for "portfolio" is large and involves several areas (APPENDIX 6), enriching the discussion of this topic, but none dealt purely with extension project portfolio. Thus, this comprehensive search engine suggests that the literature on the object of PEx reported here is quite scarce.

**Search 6:** Sites Google (multinational company of online services and software of the United States, considered the most visited website in the world) and Ecosia (competitor of Google is a search engine of German origin, aims to convert 50% of the profits obtained in each search to the planting of trees). The PEx on Google was made in the search bar with terms and key phrase. A similar search was made in Ecosia. Only the AND/OR connectors were used for refinement, not generating search orders, but causing many repetitions.

On Google, there were about 1,680,000 results for "portfolio", about 2,200,000 for "extension project portfolio" and 542,000 for "extension project and design portfolio". Ecosia did not allow specific filters until the date of the search (11/12/2020) and the result was expressive ( $n=196,000,000$ ), making the search unproductive, with very varied areas in relation to the main subject (extension project portfolio). In the case of Google with the key phrase "extension project portfolio", among 13 most relevant results, 03 extension project portfolios were found: Collection "O Fazer Extensionista: Programa de Extensão da UFES", e-Portfolio of Extension <sup>7</sup> Project in Prostheses on Implants of the Federal University of Pelotas and e-Portfolio of <sup>8</sup> Research and Extension Projects of the Federal Institute of Espírito Santo<sup>9</sup>, which served to confirm what was intended to be created in the 3D Museum portfolio in the following aspects: a) maintain the standards in the graphic design (elements, lines, fonts, etc.); b) list the staff (teachers, collaborators and extension students involved in the workshops);

<sup>7</sup> Collection "O Fazer Extensionista: Programa de Extensão da UFES". 1 extension project portfolio was considered. It has 4 volumes: Vol. 1 (2016): Cultural Spaces; Vol. 2 (2017): Health Promotion at UFES; Vol. 3 (2018): Technology and Production; Vol. 4 (2019): Communication and Culture. Available at: <<https://proex.ufes.br/portfolio-o-fazer-extensionista>>

<sup>8</sup> e-Portfolio of the Prosthesis on Implants Extension Project. Available at: <<https://wp.ufpel.edu.br/projetoimplantes/>>

<sup>9</sup> e-Portfolio of Research and Extension Projects of the Federal Institute of Espírito Santo (IFES). Available at: <<https://www.linhares.ifes.edu.br/images/DPPGE/2019/portifolio-diretoria-de-pesquisa-ps-graduao-e-extenso.pdf>>



c) explore photographs (views, angles of the images, etc.). ; d) compose photographs with texts of small blocks, with clarity of information (without competing visually); e) contact information such as email, website and Facebook; f) create virtual pages that "move" (flip pages) and can flip through them. This last item contributed a lot to what was intended from the beginning: to insert a portfolio on the website of the 3D Museum as an e-book to be leafed through. Thus, it is possible to say that Google has brought some interesting result, going against the intended design conceptions for the pM3D portfolio.

**Search 7:** Google Scholar Site or Google Scholar: Google search tool that allows you to search in academic papers, school literature, university newspapers and various articles, with numerous of them in Portuguese. On this site, PEx generated three search orders (TAB. 4). At first for order 1, in the search field of the site was launched the key phrase associated with filters F10 and F11 which resulted in a large and unfeasible number of articles (n=12,400 articles, TAB. 4) not being made appendix.

In order 2, the site menu was used, which allows you to choose the field: where my words occur. In PEx it was selected: anywhere in the article. Two new filters have been added: F12 associated with the phrase "portfolio design", and F13 associated with the exact phrase "extension projects" (TAB. 4). Filter 13A repeated the options used in the searches; However, the key phrase "of extension project" was in the singular, to try to differentiate the results. Order 1 found n=12,400 articles, not being made an appendix. After refining the search, for order 2 the key phrases connected by the preposition DE (such as a connector) and Filters 10, 11, 12, 13 and option occurrence of the words in "anywhere" of the article were maintained, having reduction to n=126 (APPENDIX 7). Of these, 12 articles were discarded (incompatible with the objective) and the remaining 114 articles that contained the keyword (portfolio) were analyzed, however, the contribution was small, since they were very comprehensive subjects.



Table 4 – Google Scholar Search (Search 7)

Order	Keywords and Connectors	Filters	Where words occur	Findings	Appendix
1	(design portfolio) DE (extension projects)	F10 and F11	-	12.400	-
2	(portfolio design) DE (extension projects)	F10, F11, F12, F13	Anywhere	126	7
3	(portfolio design) DE (extension <u>project</u> )	F10, F11, F12, F13A	Anywhere	34	8

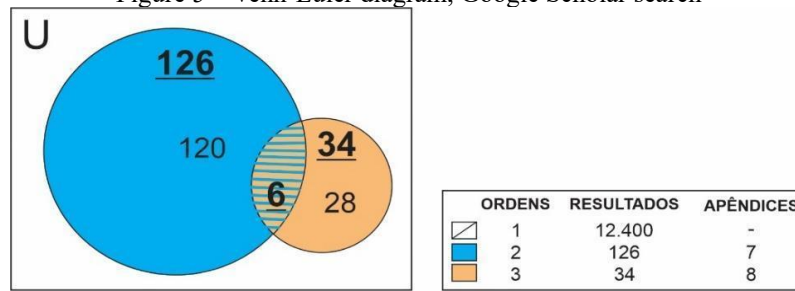
Source: Elaboration of the authors. F10 = any language + period 2000-2020; F11= include patent, include citation; F12= find articles with all words; F13: find articles with the exact phrase; F13A: find articles with the exact phrase in the singular.

Only 08 articles spoke in general terms of extension project or university extension; and of these, the extension project "Income Generation: Woman Always Alive" was expressive for the 3D Museum. This project, from the University of the Region of Joinville (UNIVILLE), develops workshops with low-income women, focusing on professional qualification and entrepreneurship (MORGENSTERN; HERMES; EVERLING, 2001). His virtual portfolio<sup>10</sup> showed great aesthetics, without conflicting elements. The history, the workshops, the products, photographs, videos (documentary about the project) and contact, brought the information in a standardized way: balanced text and several images. It was not possible to see the physical portfolio, but the site was quite clear and easy to use. The material served to confirm that what was planned in relation to the pM3D portfolio was valid: to make available to the public a portfolio of the 3D Museum as an e-book with *flip pages*. Another article brought an extension project - Núcleo de Projetos Arquitectas e Urbanos (NAU), of the Universidade Estadual Paulista (UNESP), which brought together in the ebook "Spaces Projected from the Extension" (FIORIN, 2014) the most relevant architectural works carried out by the extension project since 2010. Although this portfolio had important information it was unattractive from a Design point of view, resembling a report, confirming that it was not feasible to create a pM3D portfolio that looked like a report. Therefore, Google Scholar contributed to the idea of a differential (*flip pages*) to the pM3D portfolio, as was done later (CAMPOS, 2021), available on <<https://pubhtml5.com/homepage/vnpj>>

<sup>10</sup> Extension project "Income Generation: Woman Always Alive. Available in:<<http://projetoempreviva.weebly.com/>>



Figure 5 – Venn-Euler diagram, Google Scholar search



Source: Elaboration of the authors. (U) Universe set,  $\{1\} = U$ ;  $\{2\}$  = blue set,  $n = 126$ ;  $\{3\}$  = orange set,  $n = 34$ ;  $\{2\} \cap \{3\} = 6$  resultados.  $\square$  = no appendix was made.

**Search 8:** Site Biblioteca Digital Brasileira de Teses e Dissertações (BDTD): Integrates the information systems of theses and dissertations of teaching and research institutions in Brazil and stimulates the registration and publication of theses and dissertations in electronic media. In BDTD there was no choice option for connectors; therefore, sentences were formed with the keywords and the preposition DE (TAB 5). The filtering used F14 (legend, TAB. 5) and in advanced search, it was allowed to choose different options according to the interest of the PEx and the order generated. Eight search orders were set.

Table 5 – Search in BDTD (Search 8)

Order	Keywords in sentence	Filter	Option	Correspondence	Findings	Appendix
1	(extension project portfolio)	F14	Subject	All terms	0	-
2	(extension project portfolio)	F14	All fields	All terms	13	9
3	(portfolio extension project)	F14	Subject	All terms	0	-
4	(portfolio extension project)	F14	All fields	All terms	13	9
5	(extension project portfolio design)	F14	Subject	All terms	0	-
6	(extension project portfolio design)	F14	All fields	All terms	0	-
7	(extension project catalog)	F14	Subject	All terms	0	-
8	(extension project catalog)	F14	All fields	All terms	15	10

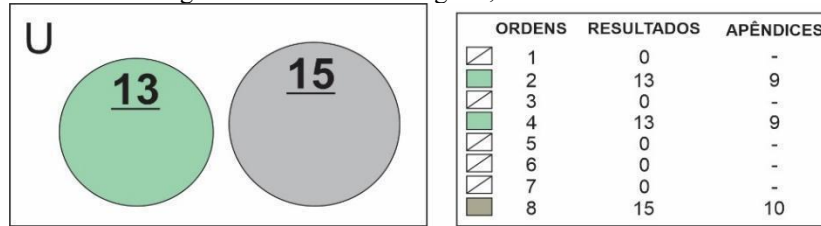
Source: Elaboration of the authors. Filter 14: any language + Period 2000-2020 + any type of document: Course Conclusion Paper (TCC), dissertation or thesis, containing images or not.

Several orders (1, 3, 5, 6, 7) had  $n=zero$ , and orders 2, 4 and 8 (APPENDICES 9 and 10) were analyzed. The diagram for this site showed equal numbers of articles ( $n=13$ ) for orders 2 and 4; and slightly higher for order 8 ( $n=15$ ) (FIG. 6) in the universe of 28 articles. The 13 articles of orders 2 and 4 were the same and none contributed to the purpose of the research. Order 8, which used the keyword catalog, presented two articles that dealt with extension projects and their collections. One of these was discarded because it did not fit the purpose of PEx and the other brought the site of the Rondon



Project Memorial extension project<sup>11</sup> of the Federal University of Santa Maria (UFESM), created in 2010, a permanent museum space that brings together research, preservation and appreciation of the history of the Rondon Project (SPIAZZI, 2011). The site, considered a portfolio, partially contributed to the creation of the 3D Museum portfolio (CAMPOS, 2021), as it contained information: history, objectives, participants, collection, contacts, participation in events, etc. that proved important to be included in a portfolio. Therefore, the BDTD website brought some contribution to PEx.

Figure 6 – Venn-Euler diagram, search in BDTD.



Source: Elaboration of the authors. = no article appendix was made; (U) Universe set with n = 28; {1}, {3}, {5}, {6} and {7} = 0; {2} = {4} green set, n = 13; {8} gray set, n = 15.

## 5 FINAL CONSIDERATIONS

The present article corroborates the authors (TREINTA et al, 2014) who cite the significant increase in academic articles as a challenge for researchers to choose the most appropriate references to build their theoretical argumentation, which implies applying a more representative bibliographic data selection methodology which, in general, is done with bibliometric studies and application of own *software*. The present study, however, showed how a broad bibliographic research (PEx) can be promising to assist in the creation of a portfolio (in this case for the 3D Museum extension project) using simple procedures such as: the choice of expressive search engines for the theme and the elaboration of a broad keyword tree (APC), associated with different filters (multicriteria system) allowed in each site, as well as well-placed restrictive (AND) and comprehensive (OR) connectors. The elaboration of the APC was a dynamic resource, which guided the PEx and the changes in the position of the connectors was a relevant strategy that defined the combination of the words and key phrases, restricting or expanding the searches. Similarly, the differentiated filtering (F1 to F14) along the PEx is significant for the change in the "n" of articles found.

The reported PEx favored the creation of a portfolio for pM3D and, equally, showed how much the literature lacks information on extension project portfolios (little expressive number of articles found) in the universe of articles about portfolios: only seven articles (01 in SciELO, 03 in Google, 02 in Google scholar and 01 in BDTD). This result leads to infer that in the period from 2008 to December 2020, practically no solid reference literature was found for the extension project portfolio, which

<sup>11</sup> Rondon Project Memorial. Available at: <http://coral.ufsm.br/memorialrondon/>



highlights the importance of PEx and the creation of the portfolio for pM3D (CAMPOS, 2021), which can serve as a model for other extension projects. However, PEx has brought a lot of interesting information on the portfolio itself, contributing to this subject specifically.

The entire PEx followed standardized procedures (creation of databases, registration of actions, creation of appendices of articles, among others) which corroborates authors (PEREIRA; GALVÃO, 2014) that report the importance of these records, for possible revision and reproduction of data. In this case, the standardization in PEx favored the dissertation (CAMPOS, 2021) that culminated in the creation of the portfolio of the 3D Museum. Therefore, the present article suggests a standardized PEx to assist the organization of data, the selection and choice of references, as useful elements to a creative process, in this case the portfolio for pM3D.

The use of Venn-Euler diagrams as a graphical representation for search orders or sets of articles, helped in the visualization of the pertinence relationships between the sets of elements found in each search engine, and thus are recommended in this study for a broad exploratory research.





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## LINKS TO THE APPENDICES CREATED

Search 2: made in SciELO – APPENDIX 1 and 2:

[https://drive.google.com/file/d/1Dt4zemrJPUDnQoO4VK4\\_zDE\\_tSwhB36o/view?usp=sharing](https://drive.google.com/file/d/1Dt4zemrJPUDnQoO4VK4_zDE_tSwhB36o/view?usp=sharing)

Search 3: made in CAPES – APPENDICES 3, 4 and 5:

<https://drive.google.com/file/d/1odM1XZfx1D73GP7TAuIf9Ye4JSwJ5-fH/view?usp=sharing>

Search 5: made in PubMed – APPENDIX 6:

[https://drive.google.com/file/d/1CUau1YUQYVbbECLbWEI7\\_nuVLo6eN0FF/view?usp=sharing](https://drive.google.com/file/d/1CUau1YUQYVbbECLbWEI7_nuVLo6eN0FF/view?usp=sharing)

Search 7: made in Google Scholar – APPENDICES 7 and 8:

<https://drive.google.com/file/d/1xpQaZYnaG7OebIvkt1jABGNRP0uluEv6/view?usp=sharing>

Search 8: made in BDTD – APPENDICES 9 and 10:

[https://drive.google.com/file/d/1PdG2TZnYmn\\_WtvTcUB52O18mTRWb7TMy/view?usp=sharing](https://drive.google.com/file/d/1PdG2TZnYmn_WtvTcUB52O18mTRWb7TMy/view?usp=sharing)