Analysis of funding for advanced training in Education Sciences in Portugal: distribution among domains and scientific areas of knowledge.

Emilce Pacheco[1] https://orcid.org/0000-0002-9666-7488
Dora Ramos Fonseca[2] https://orcid.org/0000-0003-4408-9716

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Correspondence to Authors

[1] Emilce Pacheco
University of Aveiro, Portugal
E-mail: emilcepacheco81@gmail.com
http://lattes.cnpq.br/3902573694924865

[2] Dora Ramos Fonseca
University of Aveiro, Portugal
E-mail: dorafonseca@ua.pt
CV Lattes
http://lattes.cnpq.br/52050511231420981

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ABSTRACT

Introduction: Currently, science and technology for innovation have gained greater relevance, more investments, studies to deepen knowledge about funding for science are essential. **Objective:** This article aims to analyze the direction of research funded by the Foundation for Science and Technology between the years 2018 and 2021, identifying the distribution of scholarships for the area of Educational Sciences, comparing the Scientific Domains and Scientific Areas designated by the foundation. The guiding research question is: Does the way in which FCT distributes its PhD grants make an equitable process of science production unfeasible between the Scientific Domains and Scientific Areas of Knowledge? The article analyzes the issue of financing science, focusing on Education Science and the dispute over its production and appropriation by Scientific Domains and Areas of Knowledge. **Methodology:** This is a documentary research based on data collected from the FCT website, with a quantitative approach, analyzed using descriptive statistics. **Results:** The data showed that the Scientific Domain that receives the largest amount of scholarships is Exact Sciences and Engineering and the Education Sciences Area, compared to the other areas, is in 19th position of the 36 areas that receive scholarships. There are significant differences in the distribution of grants between the Domains and Scientific Areas. **Conclusion:** Supported by the literature that investigates the area, it is considered that the financing follows a logic of pre-defined agendas, that is, the investment in instrumental knowledge is more important because it benefits the issues of the economic market.

KEYWORDS

Funding. Science. FCT. Scientific áreas.

Análise dos financiamentos em formação avançada na área de Ciências da Educação em Portugal: distribuição entre domínios e áreas científicas do conhecimento

RESUMO

Introdução: Atualmente, a ciência e tecnologia para a inovação ganharam maior relevância, mais investimentos, estudos a aprofundar os conhecimentos sobre os financiamentos para a ciência são imprescindíveis. **Objetivo:** O presente artigo objetiva analisar o direcionamento às pesquisas financiadas pela Fundação para Ciência e Tecnologia entre os anos de 2018 e 2021, identificando a distribuição de bolsas destinadas à área de Ciências da Educação, comparativamente entre os Domínios Científicos e Áreas Científicas designadas pela fundação. A questão norteadora de pesquisa é: A forma como a FCT distribui suas bolsas de Doutoramento inviabiliza um processo equânime de produção de ciência entre os Domínios Científicos e Áreas Científicas do Conhecimento? O artigo analisa o tema financiamento da ciência, com foco na Ciência da Educação e a disputa em torno da sua produção e apropriação pelos Domínios e Áreas Científicas do Conhecimento. **Metodologia:** Trata-se de uma pesquisa documental baseada em dados coletados da página eletrônica da FCT, de abordagem quantitativa, analisada por meio de estatística descritiva. **Resultados:** Os dados demonstraram que o Domínio Científico que recebe o maior quantitativo de bolsas é o de Ciências Exatas e das Engenharias e a Área de Ciências da Educação, comparativamente as outras áreas, está em 19ª posição das 36 áreas que recebem bolsas. Existem diferenças significativas na distribuição de bolsas entre os Domínios e Áreas Científicas. **Conclusão:** Sustentados pela literatura que investiga a área, considera-se que os financiamentos seguem uma lógica de agendas pré-definidas, ou seja, o investimento no conhecimento instrumental é mais importante pois beneficia as questões do mercado econômico.

PALAVRAS-CHAVE

Financiamento. Ciência. FCT. Áreas científicas.

Análisis de la financiación de la formación avanzada en el área de Ciencias de la Educación en Portugal: distribución entre dominios y áreas científicas de conocimiento

RESUMEN

Introducción: Actualmente, la ciencia y la tecnología para la innovación han cobrado mayor relevancia, más inversiones, los estudios para profundizar en el conocimiento sobre el financiamiento de la ciencia son fundamentales. **Objetivo:** Este artículo tiene como objetivo analizar el rumbo de la investigación financiada por la Fundación para la Ciencia y la Tecnología entre los años 2018 y 2021, identificando la distribución de becas para el área de Ciencias de la Educación, comparando los Dominios Científicos y las Áreas Científicas designadas por la fundación. La pregunta orientadora de la investigación es: ¿La forma en que la FCT distribuye sus becas de doctorado hace inviable un proceso equitativo de producción científica entre los Dominios Científicos y las Áreas Científicas del Conocimiento? Se trata de una investigación documental basada en datos recopilados del sitio web de la FCT, con enfoque cuantitativo, analizados mediante estadística descriptiva. **Resultados:** Los datos mostraron que el Dominio Científico que recibe la mayor cantidad de becas es Ciencias Exactas e Ingenierías y el Área de Ciencias de la Educación, en comparación con las demás áreas, se encuentra en la posición 19 de las 36 áreas que reciben becas. Existen diferencias significativas en la distribución de las subvenciones entre los Dominios y las Áreas Científicas. **Conclusión**: Apoyado en la literatura que investiga el área, se considera que el financiamiento sigue una lógica de agendas predefinidas, o sea, la inversión en conocimiento instrumental es más importante porque beneficia las cuestiones del mercado económico.

PALABRAS CLAVE

Financiación. Ciencias. FCT. Áreas científicas.

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1 Introduction

We live a contradiction in the world, thanks to the advancement of modern science there is an understanding and greater intervention in the phenomena around us, through the generation of its technologies that have provided to broaden the understanding of the real, paradoxically there is a greater difficulty in deliberating and ensuring a better future for society, even with so many advances (CARAÇA, 2020). We enjoy the benefits of scientific advancement, while we are also affected by the harmful effects that these bring with them and we cannot deliberate what will prevail in our future life.

With the change of panorama, to a globalized world, the internationalization of the economy, knowledge, and information emerges. Science and technology for innovation have gained more relevance, more investments. Within the paradoxical benefits/harm of these advances, the production of scientific knowledge can help combat the various manifestations that affect the social issue, otherwise, it can also deepen them and contribute to increase social inequalities. It is, therefore, a collision between distinct social classes around the production and appropriation of scientific knowledge and its results (RIBEIRO *et al*., 2020).

Brandão (2020) states that after World War II the vision of development centered on the pairing of research and higher education with the economy, based on a North American model, already showed that the goal was the economic appropriation of science and technology geared towards a market model, entering a technocratic matrix.

The technocratic matrix was divided into three principles: "The first is the inseparability between science and technology (technoscience), the second, is that science should serve the economic acceleration, through innovation and the third, the systemic approach" (BRANDÃO, 2020, p. 30). That is, a set of institutional actors (State laboratories, public institutes and universities) should be coordinated, with the development of financial capital in mind. Over the years, the development of the innovation economy and the logics of governance have included private actors. Nowadays, the idea of a system with interaction between the different actors and a new idea of interconnection has spread, constituting the "national innovation system" as a network of institutions, uniting public and private sectors.

In this perspective, current science is considered instrumental and the sectors responsible for investigations/research act analogously to companies, to attend the research that satisfies some sectors of the economy (CHAUÍ, 2003). Contemplating our thesis, we understand that there is a directing of resources to certain Scientific Domains and Areas of Knowledge.

The concentration of research funding in some areas of knowledge to the detriment of others suggests that there are, in practice, marked differences in financial support for the development of scientific activity. The absence of financial support generates negative consequences in the production of research in certain areas of knowledge, as well as a reduced number of researchers interested in these fields of study.

In the context of changes in the world, mentioned above, Portugal has also undergone significant changes in its system of Research and Development (R&D), Science and Technology (S&T). After 40 years of democracy and completing 30 years of integration to the European Union, the country overcame its structural scientific backwardness, through a transformation of great magnitude. At the time, it carried in its essence a dichotomy between developing a specifically national system, oriented to meet local needs, or a system integrated into an international community (HEITOR, 2015). After a period marked by many discussions, the decisions were strongly guided by political issues, namely by the influences of the surrounding contexts (RODRIGUES, 2017). Studies, regarding the theme, show that there are results of effective overcoming of the social isolation of science when compared to the state it was in (HEITOR, 2015).

The creation of the Ministry of Science and Technology and the Foundation for Science and Technology - FCT in Portugal, brought advances to science in the country. The FCT grants funding to several types of activities, through various mechanisms: research projects, advanced training, scientific employment, research units, international cooperation, among others.

Given the above scenario it is important to reflect if there are, effectively, Domains of Knowledge / Areas of Knowledge that are privileged in the allocation of public funding / FCT, considering that financial investments are essential for the development of Scientific Research / Scientific Knowledge. We researched the attribution of funding, by the FCT, to advanced training, with regard to PhD scholarships, an exclusive edict of the Foundation.

This article has the general objective of analyzing the directions to research funded by FCT between the years 2018 and 2021, identifying the distribution of grants allocated to the area of Education Sciences, comparatively among the Scientific Domains and Scientific Areas designated by the funding institution.

The guiding question of the research is centered on: Does the way FCT distributes its PhD grants make an equitable process of science production between Scientific Domains and Scientific Areas of Knowledge impossible?

For the development of the research, the following specific objectives were considered: a) To compare the receipt of grants among the four Scientific Domains; b) To verify the areas that receive the most grants; c) To compare the other areas with the specific area of Educational Science.

Thus, this article discusses the topic of science funding, focusing on the area of Education Sciences and the dispute around its production and appropriation. In addition, it demonstrates the importance of openly available data that can be extracted from electronic systems to produce knowledge, contributing to qualified discussions about research and funding in the field of Educational Sciences.

The paper is divided into three sections of theoretical contextualization. In the first section we describe the perspectives of the scientific system in Portugal, since its enlargement, after the democratic resumption, until the present time. In the second section we discuss the investments in research in the field of Education Sciences. In the third section we describe the FCT, its characteristics and responsibilities. We go through the methodological description of the present study, results, and discussions about the analyzed data. Finally, we make our final considerations about the theme under analysis

1.1 Changes and continuities in the scientific governance system in Portugal

Heitor (2015) ensures that it is important to mention, that Portugal's science and technology system grew based on science and technology policies especially associated with three dimensions: human resource capacity building; strengthening of scientific institutions, as well as internationalization in the knowledge base. These policies favored the "collective" and would become structurally different from those practiced in other European regions, with investment in science increasing significantly only in the first decade of the 21st Century.

Heitor (2015) also states that, in the last decade, investments for scientific employment, in a perspective of renewal of the research staff, the establishment of international partnerships aimed at fostering scientific networks and collaborations between companies and scientific institutions, and the strengthening of the link between university education and research, have strongly contributed in the rise of science, in Portugal.

However, when analyzing Caraça's (2020) position, he alludes to strong criticism of the scientific system in Portugal. He states that there is no sustainable funding policy for advanced training, analyzing the percentage Evolution of FCT doctoral and post-doctoral fellows between the period 1994 to 2017, and considers that most of the resources were external (EU and not national), without an effective long-term policy.

From the author's perspective, a cohesive and effective advanced training program "needs a long-term, well-structured and functioning perspective, supported by the public sector, or else in a self-sustaining interaction involving the private sector" (CARAÇA, 2020, p.25).

To some extent, in his concluding remarks, Rodrigues (2017, p. 24), reinforces the idea of lack of sustainability when he states, "In Portugal, the scientific system, having grown a lot, has not yet reached the levels necessary for its sustainability, so the goal of its construction has not yet been fully achieved."

We perceive then, based on the criticisms alluded to, arguments to analyze the lack of sustainability of science policy in Portugal, which can even seriously compromise the future of investments in science in the country. In this sense, the allocation of funding by FCT seems to us a central element of analysis when we talk about sustainability in science.

Caraça (2020) continues in the weaving of his criticism, analyzing that the scientific and technological system in Portugal is dysfunctional, stating that there are peculiarities of science policy from this perspective: the stagnation in advanced training (based on community funds) as well as the obsessive concentration on the production of good science indicators. According to the cited author, by adhering to the pre-established agenda of good indicators, local governments showed Europe that the country was on an equal footing to enter the "European adventures", namely the Euro initiative.

Almanza (2017) considers that there were positive and negative consequences of the Portuguese participation in the European integration process, when referring to science policy. Positive, when referring to the repositioning of scientific research as the basis of development and the consequent increase in its visibility. Negative, when we reflect on state funding and, also, in the scope of the definition of research problems and programs, as well as problems of epistemic nature, associated with the suppression, in research reports, of the more local specificities, difficulties and successes of investigative practice. "Scientific collaborations privilege the construction of a knowledge devoid of the particularities proper to the peripheral experience of science and more oriented towards the contents that the central countries consider generalizable and reproducible" (ALMANZA, 2017, p. 66). What we could translate as the directions for more "important" areas (we can say the direction of science for the benefit of the economic area).

It is increasingly necessary that there is political control of society, that it is a beneficiary and a real participant in the actions of the scientific system. Almanza (2017) considers that over the last century there remains little social support for scientific knowledge and weak public involvement in the discussion about the purposes, scope and effects of this type of activity.

We conclude this point with Caraça (2020, p. 22) thought on the intentions of science policy when considering that: "science policy serves, thus, to outline and develop the metrics of the future, in the field of science and technology, in articulation with the major options for the progress of society. That is, it is necessary the constitution of a long-term policy, following strategic development horizons, without losing sight of the greatest beneficiary of Science and Technology actions, the society.

1.2 Investment and research in Education Sciences: a pressing need

Vasco Graça (2009) considers that in the field of educational research, namely in Portugal, there are few studies on financing in the field of Education Sciences and, also, in the specific area of Educational Policies.

In the scientific field, in Portugal, the universities and their associated institutes and laboratories continue to produce most of the scientific research (fundamental and applied), in view of the deficit of research in charge of the private sector (CABRITO, 2004). The

University continues to be the institution that promotes the construction of knowledge, therefore of interest to large economic corporations. Some areas are overvalued, considering that they will give immediate visibility and return. We realize that this is not a reality for the Humanities and Social Sciences and, therefore, for the Educational Sciences.

Chauí (2003) states that scientific research follows an organizational pattern, that is, it uses a compartmentalized, specific strategy, in an intervention of mechanisms and means of control to achieve an objective. In this sense the author illustrates this idea by referring that: "In an organization, therefore, research is not knowledge of something, but possession of instruments to intervene and control something" (CHAUÍ, 2003, p. 7).

According to Campos (2009), especially from the 1990s, educational reforms had a great impact on society, imposing an agenda of issues that gained great visibility in the media, attracting new actors to the educational field, such as professionals from other areas, businessmen, associations and left in the background the usual actors such as teachers and their unions, experts and intellectuals of education. These reforms, as many have pointed out, were adopted based on agendas formulated by international organizations, causing common formulas to be applied to very diverse national and regional realities, encouraging international comparison based on educational and scientific indicators, bringing national debates closer to a common international agenda. The funding of research in Education Sciences has also followed these supranational agendas.

Chauí (2003) raises important reflections about revaluing research focused on education, establishing not only the conditions for its realization, but also the conditions for its autonomy. We describe the most important points to be considered according to our analysis. It is necessary: a) to create evaluation procedures that are not driven by the notions of productivity and efficiency but by those of quality centered on social and cultural relevance. It suggests that public universities and the State should make a survey of the needs of the country itself in the area of knowledge and technologies and stimulate university work in this direction, guaranteeing, through consultation with the academic communities, that there is diversification of research fields according to regional capacities and needs b) to value research in public universities through public financing policies that promote the allocation of public funds destined for this purpose through national incentive agencies, considering for example the projects suggested by the universities themselves and/or the projects proposed by sectors of the State that have made local and regional surveys of specific research demands and needs; c) that the evaluation of projects for the concession of funding be done by commissions democratically chosen by the university communities.

The reflections mentioned above, allow to overcome what Mendes (2016) describes about the scientific system and the popularity/importance offered to certain Domains/Areas. He states that the more power and visibility the scientific area has, the greater capacity has to generate more resources and produce faster and more promising results for the economy.
We need discussions regarding possible differences between Domains/areas specifically about funding in the research field.

Since the FCT is the scope of this study, we consider it necessary to describe its main attributions and responsibilities, taking into consideration that knowing them allows for a better understanding of the object of study.

1.3 The creation of the FCT and its attributions

The creation, in 1995, of the Ministry of Science and Technology - MCT, in Portugal, was an important advance and meant a deep institutional remodeling in benefit of science in the country. The creation of its own ministry recommended many decades ago by the Organization for Economic Cooperation and Development - OECD, heralded changes in the *modus operandi of the* country's science policy. For a short period of time, in 1997, the attributions of the National Board of Scientific and Technological Research - JNICT were distributed by three institutions dependent on the MCT: the Foundation for Science and Technology (FCT) which now had functions of evaluation and funding, the Institute for International Scientific and Technological Cooperation (ICCTI), with attributions in the area of international cooperation; and the Observatory of Science and Technology (OCT), with functions of observation, inquiry and analysis (FCT, 2017).

We cannot fail to mention that the policy is designed with the support of experts, which, in the Western world and under the influence of the OECD, has been oriented to put R&D at the service of technological innovation and economic development in the light of the "systemic approach" firmed in the concept of "National Innovation System" (BRANDÃO, 2020).

For the context of analysis of this study, it is important to describe this institution of the Scientific System of Portugal, because it centralizes most of the actions related to science funding. As described on the FCT official website, the Foundation is:

> "A public institute with a special regime, according to the law, integrated in the indirect administration of the State, endowed with administrative and financial autonomy and its own patrimony. It plays a key role in the system of governance of science in Portugal. Its mission is to develop, finance and evaluate institutions, networks and infrastructures, scientific equipment, programs, projects and human resources in all fields of science and technology, as well as to develop international scientific and technological cooperation, to coordinate public policies on science and technology, and also to develop national means for scientific computing, promoting the installation and use of advanced means and services and their networking. In concrete terms, the FCT's activity of promotion and funding of scientific and technological research is embodied in five different types of support: projects; human resources; institutions; equipment; and other support (meetings, publications...)" (FCT, 2022).

FCT supports advanced training through the allocation, funding, and management of research grants of various types. In this work, the main object of analysis is the Doctoral Research Grants Competition. We present below the diversity of grants distributed in the years under study, as described in Table 1:

Table 1: FCT grants and programs for awarding grants (2018/2021)

YEARS	TYPES OF SCHOLARSHIPS/PROGRAMS
2018	*Fulbright* Grants for Research, with the support of FCT Research Fellowships for NASA Internships CMU Program PhD Fellowships | Portugal *Fulbright* Grants for Portuguese Scholars and Researchers, with the support of FCT Technology Internship Grants at ESA, ESO and EMBL Technology Internship Grants for Associate Engineers at CERN Competition for the Attribution of Doctoral Scholarships *Fulbright* Grants for Research with the support of FCT
2019	Research Fellowships for NASA Internships Technology Internship Grants at ESA, ESO and EMBL CMU Program PhD Fellowships | Portugal Technology Internship Grants for Associate Engineers at CERN Sabbatical Leave Scholarships Doctoral Scholarship Competition
2020	CMU Program PhD Fellowships | Portugal MIT Program PhD Fellowships | Portugal Call for PhD Research Fellowships DOCTORATES 4 COVID-19 Doctoral Research Fellowship Competition
2021	CMU Program PhD Fellowships | Portugal Maria de Sousa PhD Research Fellowships MIT Program PhD Fellowships | Portugal Doctoral Research Fellowship Competition CMU Affiliate PhD Program Scholarships | Portugal *Fulbright* Grants for Research, with the support of FCT

Source: FCT, 2022.

The Foundation launches annual open calls for doctoral research grants in some scientific areas (36 in total). The evaluation of the applications is conducted by a set of evaluation panels involving experts of scientific merit and recognized experience. The applications are scored from zero (0 - minimum score) to five (5 - maximum score) on three evaluation criteria: a) merit of the candidate; b) merit of the work plan; c) merit of the hosting conditions (FCT, 2022).

Research activities can be carried out in any knowledge production and dissemination environment, national or international, including higher education institutions, R&D units, Associated Laboratories, Collaborative Laboratories, Technological Interface Centers, State Laboratories and other public research institutions, hospitals and health care units, other entities integrated in the Public Administration where R&D activities are developed, private non-profit institutions whose main objective are R&D activities, companies whose activities have been recognized as being of scientific interest or consortia in which any of these entities participate (FCT, 2022).

It is important to mention that the FCT follows Thematic Agendas, "aiming to

collectively promote some bases related to the themes subscribed below, for the scientific, technological, and socioeconomic development of Portugal" (FCT, 2022).

The FCT Thematic Agendas are listed below on its website: a) Agri-Food, Forests and Biodiversity; b) Climate Change; c) Portuguese Architecture d) Urban Science and Cities for the Future; e) Culture and Cultural Heritage; f) Circular Economy g) Space and Earth Observation h) Social Inclusion and Citizenship i) Industry and Manufacturing j) Sea k) Health, Clinical and Translational Research l) Cyber-physical Systems and advanced forms of Computing and Communication m) Sustainable Energy Systems n) Labor, Robotization o) Qualifying Employment in Portugal p) Tourism, Leisure and Hospitality.

According to FCT (2020), the process of developing thematic agendas is based on the involvement of the scientific, technological and business communities and other entities. This process is inspired by international practices of creating strategic and mobilizing agendas for research and innovation. Each Agenda is developed by expert groups with representatives from the scientific and business communities.

We can observe then that the Foundation has Thematic Research Agendas, developed based on international practices, where its interlocutors are members of the scientific society and economic market representatives (businessmen).

Next, we describe the methodological approach adopted in the study, for systematization and analysis of the documents found on the FCT website.

2 Methodology

The empirical study is mixed based on quantitative data and with an analysis of a qualitative nature. It is a case study through a documental research from public access materials on the FCT website. According to authors Lakatos and Marconi (2001), documentary research is the collection of data from primary sources, such as written or unwritten documents belonging to public archives; private archives of institutions and households, and/or statistical sources. Documentary research is widely used in case studies (MARCONI&LAKATOS, (2001).

In the development of the research, we used the edicts and raw data found on the Foundation's website. The data were analyzed using descriptive statistical analysis. For data collection we initially used the FCT website and through the access to PhD Research Grants we identified all the edicts launched by this agency between the years 2018 to 2021. We used the document describing the Scientific Domains, Areas, and Subareas of Knowledge (2012), to define the terms used in the study.

Only the calls for doctoral research grants were eligible for this research, since these calls offer grants for all fields of knowledge, including the central focus of this research, the

area of Education Sciences. The Foundation launches other calls for proposals aimed at doctoral studies, however, only one of them is aimed at all areas (FulBright), which includes Education Sciences, but are exclusive to researchers who already hold an FCT grant. The other calls (Chart 1) are directed to other Scientific Domains/Areas.

Initially, we analyzed the distribution according to the Knowledge Domains and Areas Designated by the FCT. It is important to mention that in the results found, the division designated by the FCT does not follow the same description officially established by the FCT in 2012. There are areas and subareas that have been permuted. For the purpose of methodological organization, we have designated the division in only two, Knowledge Domains and Knowledge Areas. As described in Table 2, the description provided follows the FCT description (Domains/Areas and Sub-Areas of Knowledge). The official designation created by the FCT is shown in the table below:

Table 2: FCT's description and official quantity for the Scientific Domains, Areas, and Sub-Areas of Knowledge

SCIENTIFIC FIELDS	AREAS OF KNOWLEDGE	SUBAREAS OF KNOWLEDGE
1. Life and Health Sciences	5	19
2. Exact and Engineering Sciences	8	65
3. Natural and Environmental Sciences	6	26
4. Social Sciences and Humanities	6	40

Source: FCT, 2012.

Four calls, for PhD grants, were eligible for this research, this being the largest program for the distribution of FCT grants. In the 2018 call, 2,567 applications were submitted for the fellowship, and 963 candidates were approved. As for the year 2019, there were 3,397 submissions and 1,366 approved. As for the year 2020, 3,797 submissions were forwarded, of which 1,360 were approved. As for the year 2021, 3,381 submissions were received, with 1,454 approvals. In the years under study, a total of 5,143 scholarships were distributed.

In tabulating the data, we separated the number of grants by domains and then by areas and year (2018 to 2021) to make statistical inferences. We systematized the number of scholarships received in order to analyze: a) The percentage corresponding to each Scientific Domain; b) The evolution of the distribution of scholarships by Scientific Domains from 2018 to 2021; c) Comparison of receipt of scholarships among all areas, in the years under study; d) Percentage of the 15 areas with the highest number of scholarships received; e) Comparison of receipt of scholarships from Education Sciences and the areas of the Social Sciences and Humanities Domain.

3 Results/Discussion

3.1 Comparison of the receipt of grants by the Scientific Domains of Knowledge

In our approach we consider only the term Area, thus totaling 36 areas within the 4 Knowledge Domains eligible to receive grants.

When we analyze Graph 1, which reveals the Distribution of the Knowledge Areas in the Evaluation Panels by Scientific Domain, we can see that the Domains to which the areas belong were distributed in percentage as follows:

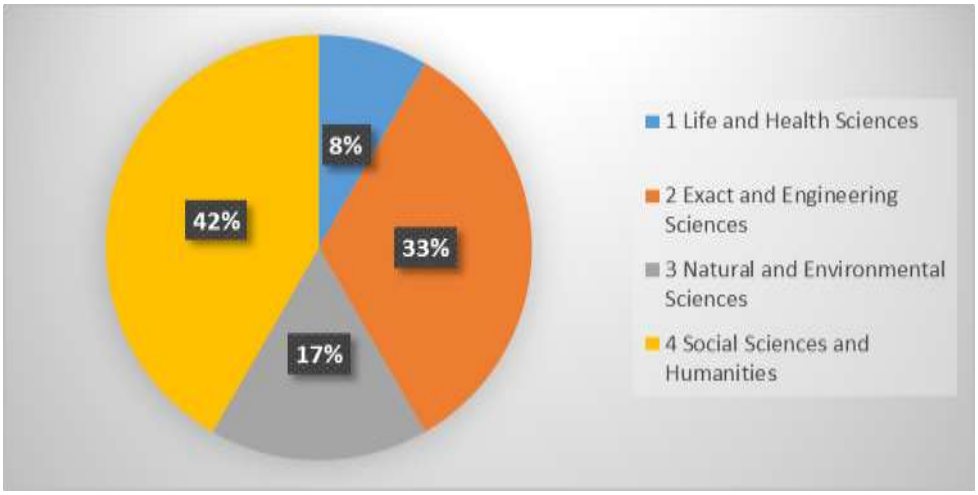
The Domain of Knowledge with the highest number of areas evaluated, is the Social Sciences and Humanities, with 42% of areas evaluated by the Evaluation Panels, that is, there are 15 areas eligible to receive grants. The area of Education Sciences (the focus of this research) belongs to this Domain.

Next, we have the Exact and Engineering Sciences Domain with 33% of the areas evaluated in the Panels, corresponding to 12 areas. It is important to resume the information in Table 2, as designated by the FCT, this Domain is the largest considering the areas and sub-areas, with respectively 32% of the areas and 43% of the sub-areas established by the FCT.

The third Domain with the most areas in the Assessment Panels is the Natural and Environmental Sciences with 17%, with 6 established areas, and lastly, with 8% of the areas assessed in the Panels, is the Scientific Domain of Life and Health Sciences, equaling 3 areas, as shown below in Chart 1.

According to Mendes (2016) the classification of the areas of science and technology is a fundamental instrument for research, for its organization and dissemination. Given that it is the first fundamental step to understand the flows of resources in research and its development and funding directions.

Chart 1: Distribution of Knowledge Areas in the Scoreboards by Scientific Domain



Source: FCT, 2018-2021

As we continue our analysis of the Scientific Domains, we see in Chart 2, the percentage of grants distributed to each Scientific Domain for the period 2018 to 2019.

The Scientific Domain of Exact and Engineering Sciences, was the one that received the largest number of grants. Of the total of 5,142 scholarships distributed in the studied period, 40% went to this Domain.

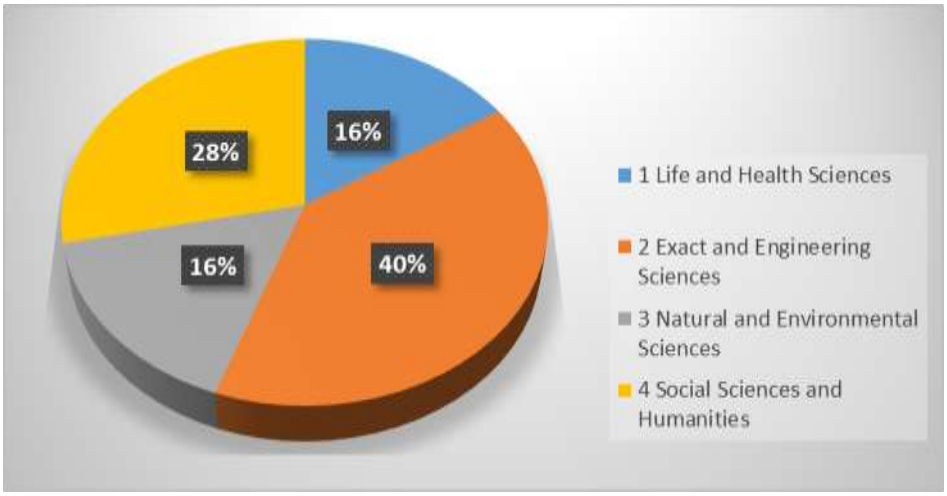
The second, with the highest number of grants received, was the Domain of Social Sciences and Humanities. Despite being the one with the most areas in the Scoreboard (Graph 1), it received fewer grants than the Domain previously mentioned, or 28% of the grants.

The other two domains each received 16% of the grants. We can already infer that in relation to the attribution of scholarships considering the Scientific Domains, there are specific areas that stand out.

The classification systems of the sciences have evolved over time accompanying the very path of individualization of a particular branch of scientific knowledge and its ability to make itself recognized by the scientific and social community, depending on epistemological as well as cultural and political criteria (MENDES, 2016).

We observe, then, that the Exact Sciences and Engineering domain is the branch of knowledge that has been most recognized by FCT for the purpose of awarding grants and has mobilized the most resources for the areas that compose it.

Graph 2: Distribution of grants by Scientific Domain



Source: FCT, 2018-2021

When looking at the distribution of scholarships, over the period under study, in Chart 3, we ratify the previous analysis (Chart 2), given that the Scientific Domain of Exact Sciences and Engineering has an increasing increase over the years and was the one that received the largest increase in scholarships from 2019 to 2021, 196 scholarships.

When comparing 2019's increase in scholarships compared to 2018, 152 more scholarships are recorded. When considering 2020 over 2019, there are 2 more scholarships and 2021 over 2020 there are 42 more scholarships.

When conducting the comparison between the years under study of the Social Sciences and Humanities Domain, we noticed that this domain also had an increasing increase in scholarships. Comparing 2019 compared to 2018, there was an increase of 120 scholarships. Considering 2020 compared to 2019, we see that there are two more scholarships (the same amount as in the Exact Sciences and Engineering Domain) and from 2021 compared to 2020 there were forty-eight more scholarships recorded (6 more scholarships than in the Exact Sciences and Engineering Domain).

When we analyze Graph 3, we notice that there was an increase of 20 scholarships in the Exact Sciences and Engineering Science Domain when compared to the Social Sciences and Humanities Domain.

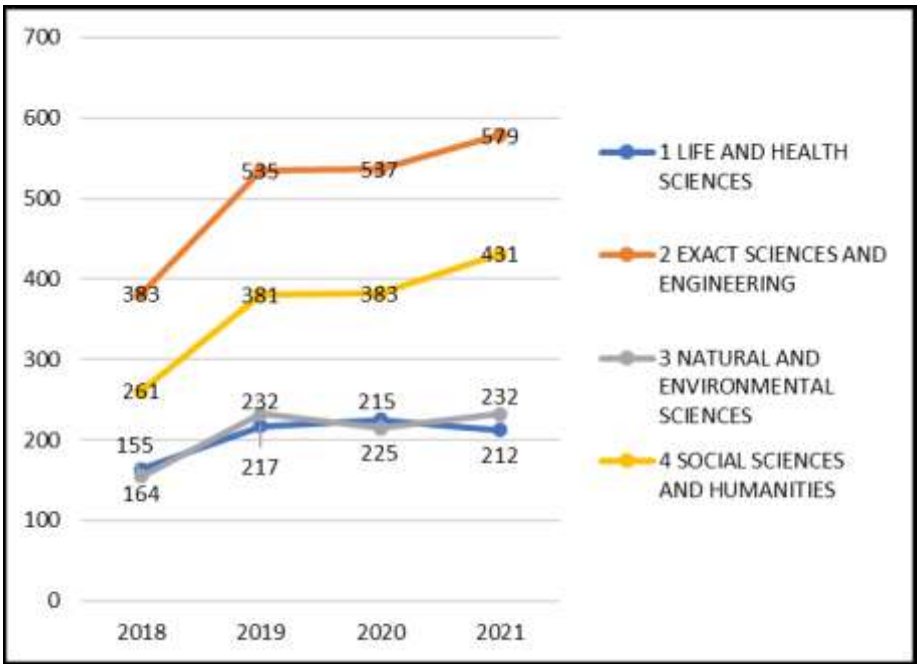
A cursory analysis suggests that there is a small difference in the distribution of grants between the Domains (20 grants). A more diligent look reveals that there is still a difference of 32 grants between the Domains when considering the year 2018. When we look specifically at the Knowledge Areas and scholarship distribution presented in the following graphs, we notice a significant difference between them.

The Domains of Life and Health Sciences and Natural and Environmental Sciences had a decrease in relation to the receipt of grants. In the case of the Life and Health Sciences

Domain, when comparing 2019 against 2018, we detected 53 more grants received. Considering 2020 compared to 2019, we recorded 8 more grants and viewing 2021 compared to 2020 we verified 13 fewer grants, a decrease from the previous year.

As for the Natural and Environmental Sciences Domain, we see that in the year 2019 compared to 2018, 77 more grants were awarded. When analyzing the year 2020 compared to 2019, we noticed a withdrawal of 17 grants and they were returned in 2021.

Graph 3: Evolution of the distribution of grants by Scientific Domain in the period 2018 to 2021



Source: FCT, 2018-2021

Graph 3 brings us back to the thought of Chauí (2003), when she states that science has ceased to be theory with practical application and has become a component of capital itself. Referring that the forms of financing of research are increasingly subjected to the demands of the market, transforming universities and research institutes and the like, increasingly operational. Instrumental science is more important than theoretical and analytical science, as in the social sciences and humanities. The scientific domain that was most prominent in the years 2018 to 2021 was the Exact Sciences and Engineering domain. As an example, even in critical Covid-2019 pandemic years, there was a decrease in grants in the Life and Health Sciences Domain.

Next, continuing our analysis, we will ratify our findings regarding the Domains by dealing specifically with the Scientific Areas of knowledge that compose them.

3.2 Comparison of the receipt of grants by Scientific Areas of Knowledge, Education Sciences and other Scientific Areas

Educational Sciences is an area of the Scientific Domain of the Social Sciences and Humanities.

In Chart 4, we analyze the order of the 10 areas (described by position) that received more grants and compare them to the area of Education Sciences. The area with the most areas is Exact Sciences and Engineering, which accounts for 6 areas. Bioengineering and Biotechnology, in the 2nd position, received 128 more scholarships than Education Sciences; Computer Science and Informatics, in the 4th position, received 106 more scholarships than Education Sciences; Electrical and Electronic Engineering, in the 6th position, received 87 more scholarships than Education Sciences; Mechanical Engineering, in the 8th position, received 50 more scholarships; Civil Engineering, in the 9th position, received 45 more scholarships and Chemistry, in the 10th position, received 35 more scholarships than Education Sciences.

Considering the field of Medical and Health Sciences as a whole, its three areas were also awarded more grants than Education Sciences. Thus, Clinical and Health Medicine, in first position, received 182 more grants than Educational Sciences; Biomedicine, in third position, received 114 more grants than Educational Sciences; and Experimental Biology, in seventh position, received 75 more grants.

Regarding the Natural Sciences and Environment Domain, we have the area of Biological Sciences that ranks 5th and received 89 more grants than Education Sciences.

Education Sciences is in the 19th position (with 149 grants received), of the 36 areas evaluated. More grants were awarded than in 4 areas of the Exact Sciences and Engineering Scientific Domain, out of the 12 areas shown in Chart 3. It received 34 more grants than Environmental Engineering, 48 more than Physics, 58 more than Chemical Engineering and 110 more than Mathematics.

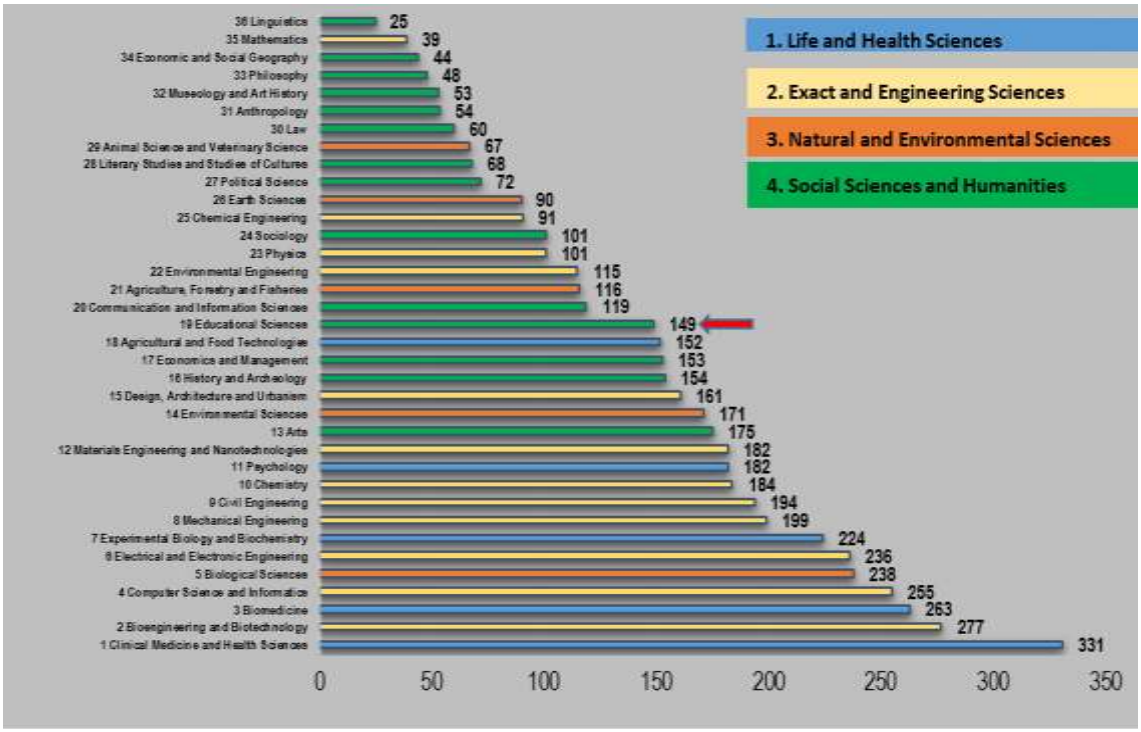
In relation to the Natural Sciences and Environment Scientific Domain, we can see that Education Sciences received 33 more grants than were awarded in Agriculture, Forestry and Fishing, 59 more grants than Earth Sciences, and 82 more grants than were awarded in Animal Sciences and Veterinary Sciences.

We notice that there is a significant difference in the distribution of grants, not only between Scientific Domains of Knowledge, but also between Areas of Scientific Knowledge.

The results of the research are in line with the thought of Chauí (2003), since she considers that the current science is considered instrumental and the sectors responsible for investigations/research act analogously to companies, serving and/or directing the research to themes/problems that satisfy some sectors of the economy. In this sense, the results of the

research presented here show that most of the areas related to the Exact Sciences and Engineering domain had the highest percentages of receiving grants, inferring that they have a relevance when compared to other domains/areas.

Graph 4: Distribution of grants by Scientific Area of Knowledge from 2018 to 2021



Source: FCT, 2018-2021

When we analyze the Social Sciences and Humanities Area, we can see in Graph 5 that there are differences. The area of Education Sciences occupies a privileged position (5th) if we compare its position in relation to other Areas, considering all the Areas of the Scientific Domain to which it belongs. In 11th position, in the general context (Graphic 4), Psychology is the first area of the Social Sciences and Humanities Domain to receive a higher number of grants (182 grants received), followed by Arts in 13th position (175 grants received), History and Archeology in 16th position (154 grants received) and Economics and Management, in 17th position (153 grants received).

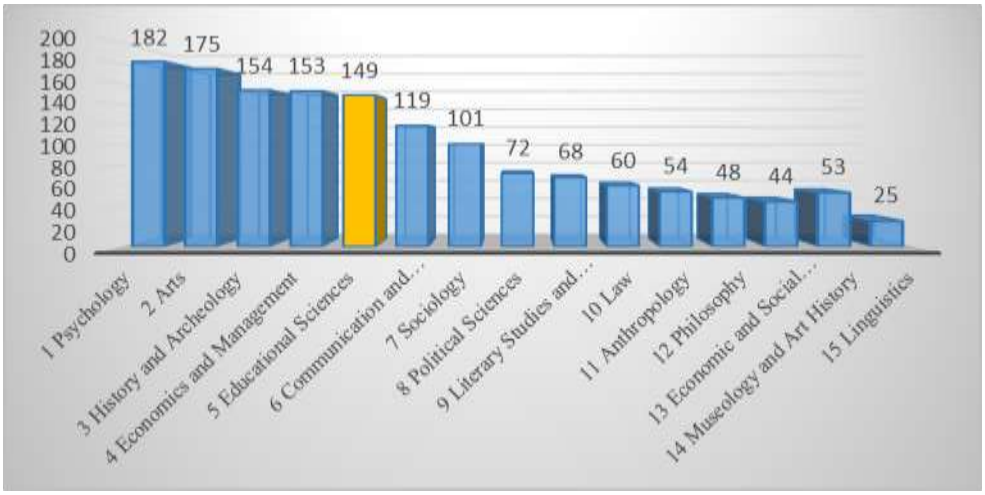
As shown in Graph 5, the Psychology area, which occupies the first position in the Social Sciences and Humanities domain, receives 33 more scholarships than Education Sciences. When we add the 4 areas that are in the first positions respectively (Psychology, Arts, History and Archeology, Economy and Management) we realize that, in total, 515 more scholarships were awarded than the area of Education Sciences. We also observe that even though they are part of the area of Social Sciences and Humanities the 4 areas have a character that is "closer" to the technical/instrumental.

Thus, Educational Sciences and other more theoretical areas that have a tendency for more analytical/critical work, receive a lower percentage of grants. One of the theses is that

works focused on the educational area do not bring immediate answers, if we compare them to more technical areas.

Considering the data presented, it seems that there is a hierarchization of knowledge, because when it comes to the allocation of funding/fellowships for research, some areas are overvalued and others undervalued.

Chart 5: Distribution of scholarships by area for the Social Sciences and Humanities Scientific Domain



Source: FCT, 2018-2021

In this context, Mendes (2016) considers that the scientific system is self-reinforcing and that more power and visibility generate more resources and greater prominence, that is, there is a strengthening of the areas considered most promising for the economy. However, for all scientific areas to fulfill their social role, it is necessary that national or international structures and funding agencies support and promote their development equitably.

4 Final considerations

The study in question shows that the FCT follows a worldwide trend in funding more projects aimed at scientific areas with a more technological character and of an applied nature. Although universities are the main *locus of* production and dissemination of scientific knowledge and there is a strong appeal for their role in the development of society, it is necessary to consider that there is a strong external regulation that conditions them in scientific research and in their mission in society. The interest in prioritizing the development of research aimed at market development and valorization of the economy can interfere with the processes of scientific autonomy and identity. In this way, it is important to note an important issue that concerns the induction of research in certain areas and themes.

We could observe that the way FCT distributes its PhD scholarships does not contribute to the production of science in an equitable way among the Scientific Domains and Scientific

Areas of Knowledge. Rather, it reinforces external determinations, following world agendas and especially the agendas prescribed by multilateral organizations.

There are differences between the areas that make up the Scientific Domain of Social Sciences and Humanities itself, showing that there is also a hierarchization of knowledge when we talk about the distribution of doctoral grants. We direct our gaze especially to the area of Education Sciences and understand the gaps in relation to other areas of the same domain and between areas of different scientific domains.

We understand that in order to debate the directions of scientific funding policies, we cannot only study the issue of funding for Doctoral Fellowships. There are other relevant themes that are important to investigate/depth, such as: research funding for research groups and other aspects that also interfere in a systemic way, such as the organization of science (statutes and professionalization in the field of research, access to resources, infrastructure, etc.). Thus, future studies that delve deeper into these aspects will benefit a broader discussion about the theme. However, the findings of the study point to the importance of investigating the direction of the scientific field regarding the funding of specific Domains and Areas to the detriment of others.

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