

Light and shadow in the Brazilian graduate studies system in health

Luz e sombra na pós-graduação em saúde

Luz y sombra en el ámbito de posgrado en salud

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Abstract

The author discusses the challenges faced by the Brazilian graduate studies system with an emphasis on the human health sector. He identifies imbalances in the supply side of knowledge, a prime territory for graduate programs, while highlighting that a proper conceptualization of such imbalances is incomplete if it fails to incorporate the demands for scientific and technological knowledge coming from healthcare services, industry, and society. He draws on concepts from technology economics involved in the innovation systems approach. The article highlights the historical and current role of Brazilian Graduate Studies Coordinating Board (Capes), particularly its evaluation system, as an essential device for overcoming the existing challenges in Brazilian graduate studies. The author concludes by suggesting some conceptual adjustments in the agency's work.

Health Postgraduate Programs; Human Resources; Research; Innovation

Resumo

O texto discute os desafios postos ao sistema de pós-graduação brasileiro, com ênfase no setor de saúde humana. Localiza desequilíbrios no lado da oferta de conhecimento, território precípua da pós-graduação, mas cogita que uma correta conceituação dos desequilíbrios não será adequada sem a incorporação de impulsos da demanda por conhecimento de base científica e tecnológica advindos dos serviços, da indústria e da sociedade. Para discutir essa abordagem, lança mão dos conceitos da economia da tecnologia envolvidos na abordagem dos sistemas de inovação. Ressalta o papel histórico e atual da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes), em particular o seu sistema de avaliação, como dispositivo essencial para a superação dos desafios existentes. Finalmente, sugere ajustes conceituais no funcionamento da agência, com vistas a essa superação.

Programas de Pós-Graduação em Saúde; Recursos Humanos; Pesquisa; Inovação

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Introduction

The human health sector plays an outstanding role in the overall research and training effort in Brazil, both in research activity and graduate studies. Human health has the most graduate studies programs, students, and faculty as well as the largest critical mass, as measured by the number of researchers involved in research lines in this sector. According to available data from the Brazilian National Research Council (CNPq; <http://dgp.cnpq.br/buscagrupos/>, accessed on 30/Nov/2013), human health represents 25-30% of all the country's research efforts and approximately 25% of the graduate courses, according to data from the Brazilian Graduate Studies Coordinating Board (Capes; <http://geocapes.capes.gov.br/geocapesds/#>, accessed on 30/Nov/2013). This weight suggests that the challenges of graduate studies as a whole are highly relevant to graduate studies in the health sector and especially vice-versa. In Brazil, human health is also the only research sector that receives input from all other major areas of knowledge.

The founders of the public health field adopted a broad view of the field's scope. This vision was systematized in the definition of public health as a field of knowledge and practices ¹. From this perspective, three vectors can be identified that demarcate the space in which knowledge and practices are pursued and exercised: (1) health-disease transitions (promotion, prevention, cure, rehabilitation); (2) health systems and policies; and (3) the cross-sectoral nature of health and the relations between health and society. The scope and existence of this space have led those of us in public health to incorporate into our mission the essential task of reflecting on the human health sector as a whole. Others may do this if they wish, but we have the obligation to do so.

These two opening paragraphs aim to claim specificity for public health as a vantage point in order to justify a paper on the current dilemmas of graduate studies in health as a whole.

A hypothesis

Graduate studies as we know them in Brazil today will celebrate 50 years in 2015. In 1965, Prof. Newton Sucupira, then a member of the Federal Council on Education (now the National Council on Education) launched the report that introduced a graduate studies policy in Brazil along the lines of that flourishing in the United States. This differed from the previous policy, based on

the European model of doctoral programs without formal courses or homogeneous standards for all the institutions. According to nearly all the experts, the new model became the most successful component in the history of Brazil's educational policy. Among other gains, it has improved the quality of our graduate studies faculty, trained more skilled researchers (increasing their output and productivity), raised the technical level of the non-academic professionals, and mitigated Brazil's brain drain.

But the success of graduate studies in Brazil generated some shadows that now raise important challenges a half century later. These include the peculiar pattern in the relationship established today in Brazil between research activities and graduate studies. Concerns with this relationship are not new. In the early 1990s, Eunice Durham stated: *"The problem is that research is excessively tied to graduate studies (...) Research incentives ended up being channeled into graduate studies programs. This introduces a serious distortion in the system... For faculty, the creation of a graduate studies course comes to be viewed as a prerequisite for establishing a research group or center, and not as a consequence of such, as would be desirable"* ² (p. 14).

Much more recently, I revisited this question in an article which stated: *"Beginning in the 1970s and for more than 20 years, the development of research, particularly concerning issues related to its infrastructure, essentially stemmed from the expansion of the graduate studies system. In other words, since the 1970s, research depends on graduate studies in order to develop"* ³ (p. 4).

Nearly 25 years transpired from the first article to the second, and it is worthwhile to ask what may have changed in the world of graduate studies. Half way to the 50th anniversary (now fast approaching), Durham's diagnosis then spoke to the core of the problem by denouncing the erroneous organization in institutions where graduate studies are located, namely, at the level of knowledge supply. Durham suggested that the attempt to increase the academic quality of graduate studies was the main challenge, and research should thus enjoy antecedence and primacy in the organization of graduate education. An example is the well-known quote by Carlos Chagas Filho in relation to the Institute of Biophysics at the Federal University in Rio de Janeiro – *"teaching is done here because research is done"*. For this to happen, a proposal was needed to reorganize the relations between research and graduate studies, perhaps sufficient to correct the issue, namely to reverse the direction of the relationship from "graduate studies → research" to "research → graduate studies".

I consider that challenge both timely and permanent. From a current perspective, it raises another, situated not only at the interface between research and graduate studies at universities and research institutes, but mainly at the interface between the latter and the external environment. The issue is to incorporate into the analysis of this distortion the demand for scientific and technological knowledge, consisting of the needs raised by services, industry, and society in general. In a complex field like human health, which increasingly interlinks government policy, an important industrial complex, and growing societal demands for health, this analytical expansion is essential.

Discussion

To anchor the analysis of Brazilian graduate studies (in the human health sector in particular) based on relations between the supply of knowledge and society's demand for it, I draw on a "conceptual family" born in the 1980s⁴ and developed in the 1990s by European and North American authors focusing on the concept of innovation systems. These can be defined succinctly as a network of public and private institutions whose activities and interactions initiate, modify, and disseminate new technologies. They can be national, regional, local, or sectoral. As for their development, innovation systems in various countries have been classified by technology economists as mature, immature, and "moving towards maturity" (in a "catching-up" situation).

Brazil still has an immature national innovation system⁵. The difficulties in the relationship between the graduate studies system and society's demand for new technologies, among other aspects, express this immaturity. A recent study suggests that based on the contribution by some key sectors (agriculture and livestock, aviation), Brazil may be entering a catching-up path⁶. Yet this is definitely not the case of the health sector. Among Brazilian authors, Albuquerque & Casiolato⁷ spearheaded research into the Brazilian health sector's innovation system, although focusing only on biomedical research. We owe the diagnosis of the system's immaturity to them.

On the knowledge supply side, the immaturity of the Brazilian health sector's innovation system is suggested by a comparison of the funding for health R&D in Brazil and in high-income countries. In the latter, private sources (predominantly on the demand side) contributed some 60% in 2010, and public sources (predominantly on the supply side) some 30%⁸. Brazil showed the opposite profile [data for 2003-2005]. Private

sources contribute 23.5% and public sources 75%. In addition, in the use of funds, industry only finances itself, and the universities receive nearly all the public expenditures. Finally, in Brazil, health system institutions and administrators have a limited role as a source of resources for R&D in health (11%)⁹. In other words, the immaturity of the Brazilian health sector's innovation system is shown by the fact that its organization is still heavily based on the supply of knowledge rather than the demand for it by industry, the Brazilian Unified National Health System (SUS), and social demands.

Other indicators corroborate the evidence of immaturity in the Brazilian health sector's innovation system. A low proportional density of researchers in the country, a persistently unstable funding structure, imbalances between areas of knowledge, and the predominance of a cross-sectional pattern of research induction that tends to separate health sector priorities from research priorities in the same sector are among the main indicators (the latter may be due to the limited presence of the SUS in the sphere of research and graduate studies in health).

But weaknesses in the demand side can be still more decisive in the situation of immaturity of the Brazilian national and health sector innovation systems. In the industrial component, this is due to Brazil's industrialization standard, associated with (and subordinated to) the global political and economic power centers. This pattern generated major difficulty in including the need for local innovations in companies' strategies. Even some highly successful health sector industrial policies – as in the case of the generic drugs industry – did without a consistent demand on the producers of scientific and technological knowledge (even in the field of pharmacotechnical innovations). In the services component, a historical distance developed between the administrators of services provision and knowledge producers. This distancing, which could be called an "anti-academic view", decreased after the creation of the SUS and especially in the last decade. However, remnants of this attitude have persisted and can be summarized in the saying that "those who know, do, while those who don't know, teach". At the societal level, the shortage of demands directly targeted to knowledge producers results from the weakness of the society's political action, traditionally spasmodic and with low organizational standards.

Recent years have witnessed positive changes in the three components of this structural pattern. At the industry level, the definition of innovation as the central policy thrust in science and

technology (Ministério da Ciência, Tecnologia e Inovação. *Plano de Ação em Ciência, Tecnologia e Inovação (PACTI)*. <http://www.mct.gov.br/index.php/content/view/full/66448.html>, accessed 30/Nov/2012), as well as the rebirth of industrial policies (Industrial, Technological, and Foreign Trade Policy [2004], Productive Development Policy [2008], and Greater Brazil Policy [2011]) in which innovation also has a strong presence, has contributed to the dissemination of this concept in numerous industrial sectors, including the health industrial complex, which is presented as one of the priority industrial sectors in the three above-mentioned versions of industrial policy.

Since the creation of the Secretariat of Science, Technology, and Strategic Inputs in the Brazilian Ministry of Health in 2003, the Federal administration of the SUS has become increasingly involved in issues pertaining to scientific and technological research, innovation, and the relations between health and economic and social development. This involvement is still incipient, but it has extended to some State health secretariats in States that are more involved in research, development, and innovation in health. A private healthcare sector has also developed in Brazil that has taken greater interest in research and innovation. Although limited to cities in São Paulo and to a lesser extent in Rio de Janeiro, interaction has increased between this segment and research and graduate studies groups.

The pressure from organized society on research and graduate studies in health is usually not direct, but mediated by healthcare managers and industry. Nevertheless, they should not be underestimated. In some of the most successful healthcare programs in Brazil, action by civil society has been decisive for stimulating the incorporation of science and technology-based knowledge into health practices. Maybe the best example of it has been the Brazilian program against HIV/AIDS. The issue is whether these demands, which are generally positive, have been adequately perceived by the supply side, and even more importantly, whether this perception has generated the required adjustments. This explains the importance of debating the challenges faced by graduate studies, a key component of health research supply. The above-mentioned argument leads to what I consider the main current challenge for graduate studies in human health in Brazil, namely, to increase their contribution to the maturation of the country's health sector innovation system.

In my opinion, two simultaneous movements are necessary to tackle this challenge. First, to help make society's demands play a more relevant role (than at present) in the organization

of R&D activity. Second, to work for R&D activity to play a greater role (than at present) in the organization of graduate studies activities in the universities and institutes. In other words, the challenge is to expand the correction of the hegemonic historical dynamic in the development of graduate studies, to attenuate the relationship "graduate studies → research → society" and bolster the relationship "society → research → graduate studies".

One reason for the success of graduate studies policy in Brazil is that its administration has been placed in a preexisting government agency, Capes, founded by the educator from Bahia State, Anysio Teixeira, in 1951. Experts also agree that the tools developed over time – particularly the model for periodic evaluation of programs – have made Capes a central component in this policy's development and ensured the agency's essential role in the current and future functioning of graduate studies.

The organization of a national science and technology system based on the supply side of knowledge has been associated with the leadership role of scientific communities in both science itself and policy (perhaps in a relationship of circular causation). Furthermore, the political weight of these communities has made their action extend beyond the academic institutional sphere to occupy a central policy management role in the two most important institutions in this field: CNPq (also founded in 1951) and Capes. This organizational format had the undeniable virtue of anchoring the system in merit-based criteria, essentially expressed in peer review for orienting resource allocation and other incentives. However, just as the success of graduate studies launched some shadows and challenges, this successful merit-based system in the field of scientific and technological policy also led to an unwanted spinoff, namely, constructing (or to be more fair, stimulating the construction of) a system in which economic and social demands were largely excluded. Importantly, this situation was not planned intentionally by the scientific leadership, but resulted (as mentioned previously) from Brazil's pattern of industrialization, suboptimal vision among Brazilian public administrators, and low pressure by organized society, all of which hindering (or at least failing to encourage) demands on producers of scientific and technological knowledge. Essentially, the organization of these two important Federal agencies was structured according to this model, and in the field of graduate studies, an organizational revision of Capes is crucial for meeting the challenge of contributing to the maturation of our innovation system.

The Capes agency has undergone many conceptual and organizational adjustments in recent decades. Most of these were in synergy with an increase in the agency's efficiency and scope (for example, the establishment and recent major expansion of the *Portal de Periódicos*, or Periodicals Gateway), and some aimed to strengthen the demand side in the organization of the graduate studies system (for example, allowing graduate courses oriented to the capacitation of non-academic personnel, also known as professional MSc's). All such adjustments have been highly welcome. However, to meet the challenges posed here, more extensive adjustments may be needed, especially in the concepts and methodology of the agency's traditional evaluation process.

One first adjustment should be to allow evaluators from non-academic institutions and fields. The current committees consist exclusively of researchers that are peers of the main actors to be evaluated. Such a shift is no easy task, and I admit that it should be implemented with caution. First, in relation to the areas or sectors of knowledge in which this might be feasible. In areas of pure or basic science, it is hardly likely that one could adopt such an approach, but the likelihood would certainly be higher in applied areas. I suspect that there would be room for this in areas and sectors related to professional training, as well as in a major portion of the social sciences. I am certain that the human health sector is perfectly eligible for it.

Secondly, the intensity of participation (e.g., the proportion of non-academics in evaluation committees) should be gauged with the necessary caution, always remembering that the matter under evaluation has a basis in scientific and technical knowledge. Thirdly, and perhaps most importantly, the qualifications of non-academic participants will be essential. Experience with the participation of external actors in the formulation and evaluation of sectorial policies, particularly in the field of human health, has proved how difficult this qualification process is, both technically and on the issue of conflict of interests. Historically, the scientific and technological communities have established solid ethical and technical foundations, although far from the neutrality and objectivity suggested by some sociology of science ¹⁰. It is highly likely that difficulties will arise in a population whose training took place in a different environment.

The battery of indicators used to evaluate graduate studies should also be analyzed. Greater weight for demand in this process will require the introduction of new indicators and adequate weighting between these and the traditional indicators, reflected in the final aggregate. On this

point, the most obvious adjustment would be a relatively smaller role for the number of articles published in indexed journals as a widely hegemonic hard-and-fast rule for measuring the productivity of faculty and students in graduate studies programs.

The organization of scientific knowledge in disciplines, seen as communications structures (and no longer only as archives of existing knowledge) is part of a historical process that includes the growing specialization of scientists, formation of expert communities, scientific communities, appearance of scientific publications and communities of authors ¹¹. This was a 19th-century construction, and today the knowledge trees (organized in disciplines) are important for the management of scientific and technological policy (and also that of educational policy), particularly in priority-setting and allocation of incentives. In a word, they are power tools in the internal environment of scientific and educational work. Confirmation of this assertion can be observed locally in the political difficulties posed by proposals for changes in the knowledge trees used by Brazil's research induction agencies.

It is understandable that there be greater resistance to changes when the proposals come from the social and economic environments, external to the world of science. However, we are now living a time with huge penetration of scientific and technological knowledge in the social and economic spheres. Meanwhile, the complexity of the problems raised by the very progress of sciences and technologies and the dynamics of their development produce increasing pressure for abolishing or at least reforming the disciplinary trees. The growing demand for contemporaneity in examining natural and social phenomena according to different views and angles, and increasingly with simultaneous participation by various disciplines, make these trees (in their current formats) increasingly dysfunctional for fulfilling their original mission. They may still play the role of demarcating power territories in the scientific bureaucracies, but they certainly contribute less and less to establishing rational mechanisms for policymaking and allocation of incentives.

According to Capes (<http://geoCapes.Capes.gov.br/geoCapesds/#>, accessed 30/Nov/2013), as of late 2012 there were 3,342 graduate studies programs in Brazil, 88% of which classified as "academic". The other 12% were classified as "professional" (or executive). The latter were allowed by the Brazilian Ministry of Education/Capes under *Ruling n. 80* of November 16, 1998, even though their admissibility was already guaranteed by the document that originally founded

graduate studies in Brazil, in 1965¹². Professional Master's programs, according to the ruling that formally created them, are self-contained and can be conducted in non-academic institutions (although in this case the institutions must submit to an evaluation of their technical competence). They are also allowed to be self-financed. They were last explicitly regulated by *Normative Ruling n. 7*, of June 22, 2009. The implementation of executive Master's course was the most important (but not the only) adjustment in graduate studies in Brazil in the sense of closer contact between social and economic demands for knowledge and its supply. However, since they were formally created, the professional Master's programs have suffered opposition from segments of the scientific community itself, which disagrees with what they view as a kind of "bastardization" of graduate education. The possibility of new modalities of graduate courses is an important part of the challenges in the maturation of the Brazilian innovation system. This emphasizes the importance of initiatives like that of Capes to grant "full citizenship" to the executive Master's courses. However, according to GeoCapes (Capes. <http://www.capes.gov.br/component/content/article/44-avaliacao/2961>, accessed 16/Dec/2013), from 1998 (the year of the ruling that established them) to 2012, Capes approved an average of only 26.6 professional Master's courses per year, as compared to 120.1 academic Master's courses. On the one hand, this suggests resistance by institutions and their respective scientific communities to proposing new professional Master's programs, and on the other, difficulties in approval of them by the scientific communities represented in the Capes committees.

Conclusion

The strong presence of Capes in this article should not lead readers to conclude that the agency is responsible for the imbalances in Brazil's national and health sector innovation systems. As we intended to show, the "short" side in this imbalance is that of demand. The most important movements towards "catching up" and maturation of the health sector innovation system should be expected of industry, health services administrators, and society. But in addition, on the side of the production and supply of knowledge, the agency should not be held accountable for the existing problems. On the contrary, the Capes trademark is nearly always present in whatever brilliant results graduate studies policy has given Brazil in the last half century. The political, administrative, and bureaucratic challenges that still (and increasingly) burden Brazil's public universities and other institutions that produce scientific and technological knowledge and the progressive political and administrative straitjacketing caused by the often disastrous action of oversight agencies and other central agencies have been the true cause of permanent imbalances and frustrated expectations

By making the types of adjustments suggested in this article, Capes will become an essential political and administrative agency for dealing with the challenges currently faced by graduate studies in Brazil. From my perspective, action by Capes alone will not be sufficient to overcome the challenges, given the importance of the movements that need to originate and develop on the demand side. But the agency will certainly continue to be a key link for meeting the challenge of achieving a mature national innovation system in various sectors, including that of human health.

Resumen

El trabajo discute los retos fijados a los programas de posgrado en Brasil, con énfasis en el campo de la salud. Identifica algunos problemas desde la perspectiva de la oferta de conocimiento, que es el territorio específico del posgrado, mientras cree que una correcta apreciación de los dichos problemas implica analizar variables que se localizan desde la perspectiva de la demanda, tales como la industria, los servicios de salud y la sociedad. Para discutir el problema desde esa perspectiva, se utiliza como marco teórico el concepto de Sistemas Nacionales de Innovación. El trabajo da énfasis al rol de la agencia brasileña de posgrado (Capes), en particular el rol de su sistema de evaluación periódica de los programas. Por ende, hace algunas sugerencias de cambios con el objetivo de superar los retos apuntados.

Programas de Postgrado en Salud; Recursos Humanos; Investigación; Innovación

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