

INSTITUTIONAL PECULIARITIES  
IN THE TRAINING AND DEVELOPMENT  
OF UNIVERSITY RESEARCHERS:  
SOME OF ITS MAIN ACTORS' EXPERIENCES

Verónica Ortiz Lefort\*

Translator: Pablo Contreras Fresán  
E-mail: [deepcolearning@gmail.com](mailto:deepcolearning@gmail.com)

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\* Professor-Researcher, Education Department,  
Center for Social Sciences and Humanities,  
Universidad de Guadalajara.  
Email: [vero\\_lefort@hotmail.com](mailto:vero_lefort@hotmail.com)

## Resumen

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Uno de los aspectos fundamentales para la comprensión de los procesos de formación de investigadores lo constituyen las particularidades institucionales, ya que es en éste ámbito en el cual el investigador es formado y posteriormente se desarrolla. La eficiencia de un investigador también depende de ciertas bases estructurales y políticas que subyacen a todo trabajo particular que realice. Tratar de avanzar en la comprensión de cómo operan estas condicionantes y cuáles son sus principales repercusiones en la formación y desarrollo de investigadores, son los objetivos de este artículo.

### Palabras clave:

- Formación de investigadores
- Desarrollo de investigadores
- Estructuras organizacionales
- Misión universitaria
- Universidades e instituciones de educación superior

## Abstract

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One of the key elements in understanding research training processes is the institutional environment in which researchers are trained and subsequently develop their professional life. The efficiency of a researcher also depends on certain structural and political foundations that underline all the tasks they carry out. The objective of this article is to attempt to further the understanding as to how these conditions operate and what their main impact on research training and development is.

### Key words:

- Research training and development
- Organizational structures
- University's primary function
- Higher education institutions

## Introduction

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In most Latin American countries in the early twenty-first century, research training and development is still carried out mainly in higher education institutions (HEIs) and public universities, where doctoral programs are predominantly the point of departure for these training processes. Scant attempts have been made for training researchers in the private, productive and business sectors as their investment in science is also meager.

It is understandable then, why in countries like Mexico researchers, and their work, are largely dependent on the existence of the capabilities present in the institutions where they study, and later develop, as these organizations are reliant on the regulatory conditions, and national science funding policies, that ensure their development, which are in turn embedded in their respective countries' economic models.

Despite various efforts, scientific, technological and humanistic research and therefore the training of new researchers, hangs by the thread that bureaucracy imposes, decrepit and “one-eyed” science and technology policies, and some politicians' obtuse visions, who fail to grasp the significance of their decisions in this area for the development of the country. But also some not so successful strategies by a few not quite scholarly academics, that muster the power to organize, manage and plan Mexican universities.

In Mexico, more than ever, some science and technology policies such as the low percentages of gross domestic product (GDP) spent in the development of scientific activities (0.35% for 2009), have cast a dark shadow inside the universities, e.g. some common practices currently used by most researchers in the mad pursuit of “points” seeking to qualify for the various evaluation exercises put in place by the few funding agencies that support science in Mexico, to be eligible to receive economic incentives and the minimal resources to develop their activities, which in turn leads to increasingly move away from the real mission of scientific research that is to generate knowledge to benefit society.

The adaptation, submission, subordination, or however it may be called, to these practices by academic and scientific communities in Mexico, translate into training new generations of researchers who learn how to survive in academia through the repetition of the same practices and methodologies.

The first consequence of this is that it hinders creativity, imagination and the scientific attitude. Sadly, large numbers of researchers and graduate students fail to generate original knowledge beyond what was done by their colleagues or predecessors, to impact different social sectors through tangible benefits, and allow Mexico to gradually become more competitive and stand out in the international scene, not just to remain as a knowledge reproducer.

It would seem that these scientific practices are further reinforced by current global conditions outlining new ways of doing science, as with the boom of the few academic exchanges and emerging international agreements, of which the main result so far has been that they further strengthen cultural

dependence as well as foreign research approaches and models adopted by some Mexican research groups.

Then there is the academic game where researchers recognize certain “stars” who take on this role and show a set of attitudes and behavior in relation to their academic peers and students, actually positioning themselves high in the hierarchies of Mexico’s scientific structures, which needless to say turn out to be obsolete for training new researchers, providing employment and developing relevant, timely and frontier science. Harsh but true. Have we forgotten what science is for, and why it is conducted? How do researchers experience these conditions? What are their impressions and what are their strategies to overcome such conditions?

These are some of the questions this paper explores departing from the hypothesis that beyond individual or collective efforts by researchers, their efficiency also depends on certain structural and political frameworks that underlie all the particular tasks they perform. The objectives of this study are to investigate how these constraints operate and what their repercussions are in the formation and development of researchers.

We report on some key findings from qualitative research done through thematic interviews with 36 researchers from 3 public universities in Mexico, which from their perspective represent some of the specific institutional arrangements that help or hinder their performance.

## National policies and the university as an institution

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**I**n Mexico as in the rest of Latin America the development of research responds to certain historical, cultural, academic and budgetary conditionalities. One of them, perhaps the most important, is the lack of investment by government and business sectors in science and technology as well as the lack of strategies to provide real and effective support that will lead to the development and consolidation of research, a very general idea of this can be found in the following:

According to the National Council for Science and Technology, CONACYT (2007) and the Organization for Economic Cooperation and Development, OECD (2009), Mexico registered the lowest investment in science among the 30 OECD countries. Our country ranked lower than Slovakia, Poland, Greece, Turkey and Hungary, while Mexico invested about 0.35% of GDP, these countries spent between 0.5% and 0.9% of their GDP in this sector. Some Latin American countries like Chile, in 1993 spent 0.8% of GDP for developing science and technology (2.5 times more than Mexico), and since 1981 Brazil has sustained, the same percentage: 0.55% (1.72 times more than Mexico).

The same OECD report notes that up until 2005, Mexico had a scientist for every thousand workers among the economically active population (EAP). That figure falls far short compared to 16 in Finland, 13 in Iceland, 12 in

Sweden, 11 in Japan and 10 in Denmark and New Zealand. Even when compared to 1.5 in South Africa and 2 in Argentina and Romania.

If we add to these data the almost non-existent connection between the various productive and business sectors and the universities, the picture turns more than dismaying, because in Mexico the share of industry spending on research and technological development represents only 10% while in first-world nations that share ranges from 42% in Canada to 73% in Japan.

The lack of interest shown by these sectors in scientific and technological development can not be reduced to show Mexico's great weaknesses in this regard, but it also reflects the lack of government strategies to design specific policies to encourage real benefits for both groups, industry and the productive sector through tax exemptions on investments or grants for scientific and technological development.

In return, universities could meet the needs of the productive sector by offering a variety of services in science and technology in exchange for these resources, just to name a few possibilities.

Because, for example, in the United States, despite the various questions and criticism since the beginning of the second world war, the U.S. Congress has put into operation a model to support national scientific research, based on the relationships of universities and government for which financial subsidies have been modified according to the evolution of these relationships.

Therefore in the fifties, the U.S. Congress reorganized and expanded committees, new agencies and industries such as: the National Science Foundation (NSF), the National Institute of Health (NIH), the National Aeronautics and Space Administration (NASA) and the Atomic Energy Commission (AEC), among others, whose main aim was, and still is, to strengthen the development of science and technology. Since then, in addition to financial support, the policy of Congress has been to create a social and political climate that has favored science in every way, to the extent that in the public mind, progress is linked to their trust in science and its results. Investment in science and technology, we know, is generating new industries and new jobs, hence more development for the country and better living conditions for its inhabitants (US Congress, 1994).

In Mexico, albeit on a much smaller scale, science has occasionally received this type of support, when some lucid president had the foresight to place such activities as priority strategies for the development of the country, as occurred during the administration of General Lázaro Cárdenas, "it was emphasized that continuing research could not be ignored in budget priorities" (Robles, 1993: 159), the expropriation of oil in 1938 forced Mexico to produce its own oil once nationalized. "Once the first challenge was met, scientific research raised the second, to educate chemical and petroleum engineers, mechanics and electricians, geologists and mathematicians to begin the process of oil transformation" (Robles, 1993: 169). As we can see, this time in Mexico's history clearly shows the results that can be achieved when there is a shared commitment by government, universities and the productive and social sectors, contrary to what is happening today.

The following shows another successful period for scientific research in Mexico as told by one of the interviewees:

... At a point during the López Portillo six year presidential term, Mexico was going through an economic boom! Large newly discovered oil reserves, especially that... the term López Portillo used was “we are managing the abundance or we had to manage the abundance “... something like that, well the point is that the government was very supportive of research activities, and definitely... On the one hand, sending many people to study abroad!, but also at the universities you got paid well, very well!, researchers had a terrific salary!, it was almost mythical... from there the opening of new institutes, new research centers and many resources for the existing ones, a boon for science in Mexico. (Researcher 0101N3)

Despite the vision of political leaders, the policies that they design for research and research management are extremely important, the role of academic and administrative university leaders is also undeniable in this regard because the capacity building for research, the design of institutional structures, the best use of resources and the appropriate transfer of knowledge depends on their performance and that of their teams.

Continuing support for its proper functioning is not only limited to the stages of national postgraduate training but also the designing of strategies for linking research and its products to society in general, with different sectors and other institutions. These are the responsibilities of higher education institutions and not only governments. The following account gives us an example of this:

...That was very important because there was all this support. There were important institutional conditions... the head of that department, before becoming the Rector, changed it to the Department of Scientific Research and Academic Improvement... That was crucial, because he laid the foundations for the whole development of scientific research in this university, through the Department and through the creation of research centers, the creation of all the institutional conditions for research!, we received a lot of support!, we were trained, they gave us resources, scientific research was fostered!... (Researcher 0102N3).

As may be observed, according to the experience of this respondent, as well as the dependence on national policies there is another peculiarity about university research, in regard to the vision of its leaders, yet with few exceptions, like the example above, it is rather common to find in these institutions that the authorities and directors of university research often lack sound scientific policies as well as effective and timely institutional instruments to promote and evaluate research.

These experiences recalled by some researchers –members of the National System of Researchers (SNI) with recognized academic careers– provide

evidence of the direct importance of government policies on the development of science in Mexico and thus in turn on university research.

There is no doubt that for several decades the current government has not seemed concerned with science and development in the country. To encourage the participation of the private sector and corporate research in technological development, increasing the share of GDP invested in science and technology and the designing of a national strategic science plan can no longer be postponed nor avoided.

## The mission of universities and their organizational structures

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Another dimension to consider in this analysis is the university mission, understood as its *raison d'être*, which justifies and directs its functions and activities. It seems to be common in Mexican universities (even with the passage of the centuries) that their primary mission is unchanging, for one of its institutional features inherited from the Middle Ages, is to privilege the teaching function.

Since its inception, the essential reason for these organizations was to prepare professionals who received a degree offered by a “Faculty” when they were considered ready to teach a particular academic discipline, and were capable to do so. It is only in the early 1920’s, that “in Mexico City were the resources and a suitable environment present for the few limited scientific research activities being undertaken in the country” (Robles, 1993 : 122), thus initiating the first attempts to institutionalize scientific research in public universities.

Teaching, teaching, teaching and little research, this system is practically reproduced without any significant changes until the last decades of the twentieth century, when teaching overwhelms academic activities to meet the growing student population, massified since the early 1960’s, further hindering attempts by some emerging groups to strengthen academic research in Mexico.

History clearly shows that complete devotion to research by university scholars is null and in fact has never existed, even after the creation of the National Council for Science and Technology (CONACYT), the National System of Researchers (SNI) and the momentum of the 1980’s.

The Researcher-Professor’s multiplicity of functions, is exacerbated by the rigidity that characterizes these institutions in the application of certain criteria such as the requirement for investigators on the number of subjects they ought to teach twice a year and the narrow conception of teaching—hours in front of a group— which only have a negative impact on research (Chavoya, 2002), time taken away from their own activities in the creation of knowledge.

Yet in addition to the institutional constraint that their original mission imprints on universities to engage entirely in the research function, there

is another paradox: these important two university functions, teaching and research, are decoupled in practice.

Being a good teacher involves a serious commitment, to prepare lessons and materials, resource to the literature, mark tests and papers, participate in courses and workshops, to be up-to-date and to innovate, to name only a few activities. That is why for those engaged in research as a main activity and function, teaching is an aggregate to their activities and they do not wish to devote as many hours in front of a group. To be considered a good researcher, to publish, to have enough financial resources to effect the work leading to the planned results, one must do so by competing for resources presenting projects; as a thesis director or supervisor, to provide continuing support to graduate students by reviewing their work; also working on collaborations, among many more different activities, it all takes an extraordinary amount of time that is not justly valued.

So that, in general, the university research community tries to maneuver between these different functions with conflicting interests. What turns out to be even more complicated is to also consider the administrative activities that are to be complied with, such as filling in reports, forms and evaluations, to assist others in evaluation, cost management and a host of other operational activities that generally have to be tackled in the absence of support staff. In this regard, one respondent commented:

...You have to do many other things, to continue doing research, that's what happens ...you have to continue to provide thousands of classes to qualify for the incentives, for example. Because you are told, you have to teach more than 10 hours a week if you want the highest incentive, well that is in conflict with what my appointment says... the statute, says that if you are a teacher-researcher you have to commit 6 hours a week or one subject, however long it is, but if you want the incentives you need to teach many more hours than that, so in my case I teach more classes than what I am supposed to teach, it doesn't bother me but... you end up spending a lot longer on teaching and everything that it's associated with it... all the meetings... this and that... much more than to research!... (Researcher 0108M2 )

The last point of having to do everything because there is no support staff, was mentioned by several researchers and constitutes another very serious problem, the functional imbalance in the organizational structure, pyramid and flowcharts (Feller, 2002; Payne, 2008) in Mexico's public universities, including contractual categories offered, represents a problem that clearly hampers the performance of researchers and groups. Another respondent said:

At least when I came to this university, ... yes there was a pyramid! in which few of us had a chair. There used to be more associates and assistants and usually as chairs we did have assistants. Now no one has assistants because they almost do not exist! because the university has yielded to higher pressures, especially from SEP, it has had to adapt. And it is not easy for new teachers to enter with full-time appointments, not even part time, unless, what's it called

when someone gets the chair of a retiree?, Yeah, replacements... That's crucial, the pyramid structure ought to work! and now this pyramid is inverted... (Researcher 0101M3)

The problem is not only that in the organizational structure there are no institutional strategies (Payne, 2008) and replacement strategies (let alone growth) for the reproduction of each of the contractual categories, which has resulted in an organizational pyramid that has been inverted, but also that these categories are symbolic in that they are granted or aspired to for better economic status and rarely for functional performance as established officially by the institution itself.

This again shows that there is no connection between the national and institutional policies given that the former very likely, in the official discourse, states the need to create new chairs for researchers, however, this fails to materialize in the universities, especially in state institutions. Empirical evidence shows that it is not true that on the local or regional scale the human resources needs for research are being met; the actual conditions for the integration of junior researchers by creating new appointments have not been established. What then happens to newly graduated doctors?, one respondent stated the following:

... We have Masters, we have Doctorates, we are training researchers, yet the question remains why and for whom, if we are training researchers, where is the work field? If there are no new appointments! if there are no new jobs then we are training the unemployed!, yet on the other hand, as a country we need more researchers... then we have to look at the policies, the relationship between national and institutional policies! we can see that the research faculty is aging and we must begin to create new chairs for new researchers... there are no such conditions, any conditions, I don't see where is this all leading to... (Researcher 0111Mo)

According to the above, the organizational structure of public universities has exceeded its goals, objectives and functionality, this pyramid has been inverted and there are more researchers with chairs, fewer associates and even less assistants. The lack of planning in human resources devoted to research is evident. The pressure on universities as part of strategies to institutionalize the role of research has led to a huge discrepancy between official policies to strengthen and the specific conditions under which it actually takes place in universities.

## Final thoughts

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I can not fail to mention, together with the above, that since the emergence of models of regional integration and globalization, new practices, such as the network integration of knowledge (Tushman, 1980) which have been resourced to more often by a higher number of researchers who,

with increasing ease, are linked with groups that for various reasons, usually historical, have developed in academic communities with structures much more organized and planned (Charle, Jürgen and Wagner, 2004, Van Den, 1977) or structured fields, as Bourdieu used to refer to them. Therefore there exists the phenomenon of importing external elements to a national field, which at the same time has enabled researchers to enhance and strengthen their positions in these fields within their own institutions (Charle, Jürgen and Wagner, 2004).

These emerging modes of relating and doing research, call for new organizational structures, communication and organization and possibly even new problems, set by science policy programs and negotiating processes that become foci for the formation of new hybrid research communities (Van Den, 1977).

Due to the above, new problems arise, for example, in countries like the u.s. and Japan, or Europe, the demand for a socioeconomic evaluation of research results has been the strongest for a decade or more (Cozzens, Kamau and Bortagaray, 2002), and a demand for a new vision in Mexican universities, particularly in the redefinition of their mission in terms of their substantive role in scientific, technological and humanistic research as well as in the training of its researchers.

Scientific activity in general, regardless of its results, may not be understood, much less improved without including broad and open social and institutional processes as part of its dynamics. The search for new strategies and innovative policy (Feller and Cozzens, 2007), could not be formulated in isolation from its main actors, therefore this research attempted to recover their experiences and impressions.

The issues discussed represented some of the most important concerns and interests for the researchers interviewed, with the understanding that these issues do not exhaust the complexity of academic research or research training, but provide the context in which researchers operate and represent the system of social situations and conditions that shape it.

Using innovative tools such as thematic interviews offered a broad, participatory and inclusive view which allowed to approach the understanding of reality through the experiences that the researchers may experience in their daily lives. Something to be gleaned: researchers' interest and willingness to pursue their careers, transcends the cultural and overcomes the institutional.

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