

# THE AMERICAS



# POSTGRADUATE DEGREES AND RESEARCHER TRAINING IN ARGENTINA

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## RECENT TRANSFORMATIONS OF ARGENTINA'S HIGHER EDUCATION SYSTEM

The expansion of higher education systems that began after World War II is a phenomenon shared by practically every country, regardless of its unique modes and traditions. There are other features in common besides expansion: among others, the separation into various levels (including the rapid growth of higher nonuniversity education), the fostering of research, and the development of postgraduate education. Osvaldo Barsky (1997) states that three of the factors that contributed to this process were the following: (1) a certain causal relationship between higher education becoming *massified and segmented*; (2) the scientific and technological explosion, and the subsequent broadening of the *knowledge-based economy*; and (3) the political determination of national states to contribute to the expansion of higher education systems, emphasizing advanced studies.

Barsky cites another series of factors that specifically have a bearing on the development of postgraduate studies. These factors allow us to depict the differences in the models and specific characteristics that postgraduate training acquires in each country, regardless of the general trend. Some of these factors are exogenous and others endogenous as regards university institutions; Barsky specifies them as the following:

- the *centralized or decentralized nature* of the higher education system;
- the *size* of university institutions;
- the *unity of teaching and research* as derived from the Humboldtian conception of higher education;
- the *organizational logic* of research activities in the realm of the university; and

- the *concern for reducing costs* (as a result of the massification of higher education), added to research and development (R&D) policies that tend to concentrate research and the training of a critical mass of scientists working in certain key subjects.

Besides the above-listed factors, one should also take into account the scientific and academic tradition of a country, and, as a general context, its degree of economic development and industrialization.

Analysis of the development processes of postgraduate training using the criteria outlined above helps explain the different directions they have taken in countries that—to an untrained eye—have similar structural characteristics, such as Brazil and Argentina. Although both countries share many features and at present belong to a common market (the MERCOSUR), their degree of industrialization is different, as are the historical processes through which both societies acquired the features that may be termed “modernization”; among these the diversification of the social structure and the level of education of the population. In the 1960s, when Brazil reformed and expanded its system of higher education and postgraduate training, the prevailing feature was that of an accelerated and successful industrialization process, which exerted pressure on the social structure of incipient modernization.

Argentina carried out a reform of higher education during the first years of this century; its society was “modern”—in line with the most advanced in Europe—although its economy was based on revenues from farming and agriculture. Some of these reform features lingered until the 1960s, and the Argentine scientific system achieved a certain splendor. This infrastructure enabled some researchers to be awarded the Nobel Prize in the sciences. In those years, however, the delay in industrialization was beginning to be felt, and the economic crisis that was to come later was starting to take shape.<sup>1</sup> This had an influence on the higher education expansion process, which

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<sup>1</sup>Development of a thesis on the asymmetries between modernization and industrialization can be found in Suárez (1972).

was basically geared toward traditional professional training rather than to the training of the high-level human resources industry demanded. In that context, postgraduate training in Argentina remained significantly backward vis-à-vis that in other countries, such as Brazil.

It is worth pointing out that the expression “new trends in higher education” is, to a large extent, a euphemism for “the spread of the U.S. model of higher education.” In fact, many features of the new model are customary in that country: the segmented structure, the role of research, the training of scientists and engineers, and the fact that higher education is not free, combined with the availability of a variety of private sources for donations and fellowships. Also—unlike in other countries—private universities are a major feature of the system.

This model is in keeping with the basic U.S. political philosophy, in which education and science are not responsibilities delegated to the federal government; this implies that the government does not act directly upon the fields of education and science. During World War II and after, American society carried out very complex debates aimed at establishing the extent to which the federal government should play a role in fostering fields of science and technology. The spread on a worldwide scale of the U.S. model has to do with its success in the context of the American economy, and with the importance that the United States itself has ascribed to this issue, which has been expressed in periodical reports alerting Americans to the strategic value of knowledge ranging from the historical *Science, the Endless Frontier* (Bush 1945) to the most recent *Unlocking Our Future* (U.S. House of Representatives 1998).

The relevance of the process of reform in higher education, and the training that scientists and engineers are undergoing in almost every country in the world, is also in keeping with Daniel Bell’s theory of the post-industrial society, according to which knowledge is the central characteristic of the transformations of a social structure (Bell 1974). Therefore, institutions concerned with knowledge (particularly universities) become all-important institutions in society, and, at the same time, they themselves go through great transformations. Bell warned, however, that his statements applied to a handful of countries and could not be applied to developing countries.

The development of competitive conditions and their ideological unfolding accelerated the process of reform in higher education during the 1980s and forced changes in

countries that had originally resisted adopting this model. It is natural, however, that the model’s spread turned out to be wider and swifter in countries that put active policies of industrial development into practice, such as Brazil; and that it should be faced with greater difficulties in countries with more traditional social structures, such as Argentina.

## HIGHER EDUCATION IN ARGENTINA

### THE ARGENTINE TRADITION

Postgraduate studies have a short tradition in Argentina, as a result of the university model that was strongly established in the country since the beginning of this century and which has remained without structural changes for decades in a context of economic crisis and scarce industrialization. It was only in this last decade that a great expansion in postgraduate training has been taking place and that certain symptoms of reform and updating of the higher education system as a whole can be perceived.

The Argentine university system is very old and dates back to the early colonial period. The first university founded in present-day Argentine territory was what is today the Universidad Nacional de Córdoba, created in 1610. The Universidad de Buenos Aires was established in 1821 after Argentina became independent from Spain. In the last years of the last century, as of Sarmiento’s presidency, successive governments put into practice policies supporting education and science as part of a project to build a modern state that would break away from the colonial tradition and unify the country after decades of civil war. During his term, President Sarmiento invited, in 1870, the American astronomer Benjamin Gould and a group of collaborators to live in Argentina; they created the Córdoba Astronomic Observatory. President Sarmiento’s speech at the inauguration of the astronomic center is regarded as one of the founding documents of science policy in Argentina.

Development of the contemporary Argentine university system has been influenced by two strong traditions: the Napoleonic model, whereby the state takes on the responsibility of higher education and the regulation of professions with a rigid, compartmentalized bureaucratic structure; and the model of the German scientific university created by Wilhelm von Humboldt, which gives precedence to research. In 1891, the Universidad Nacional de La Plata was created; it was expressly informed by

the Humboldtian model. In fact, it was not a mere adoption of the model, but rather involved cooperation with German scientists. This university was very active in some domains and paved the way for the first development of a modern school of physics in our country.

With varying force, both influences converged to underscore the responsibility of the state in matters of higher education. This became a lasting feature in the Argentine educational model, which has a strong public preeminence. In 1918, the University Reform movement established the autonomy of universities and the concept of “shared government”—i.e., participation of students and graduates in the government of the university. That tradition is enshrined in the present Law of Higher Education (Law #24.521, *Ley de Educación Superior—LES*), which legalizes autonomy and shared government as basic principles of the university system.

In spite of the fact that the Humboldtian tradition lies at the very foundation of the Argentine university model, the weight of the “professionalist” trend became dominant. It should be emphasized that in this area, the Argentine university was successful. It trained professionals at an internationally renowned level and responded to a growing demand for higher education. Nevertheless, the hegemony of the professionalist trend meant that teaching became a part-time dedication and a supplement to professional work outside the university, among other consequences.

Since the beginning of the century, one of the main conditions the Argentine scientists have laid claim to has been that of having full-time employment status for some university posts, with a salary that allowed them to devote themselves entirely to teaching and research. The resolution of this conflict was rather peculiar. Not many full-time posts were created, but in 1958, the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) was established. The CONICET was conceived of as a structure with paid staff, organized hierarchically and serving as “career researchers.” Originally, this “career” was supposed to be supplementary to teaching at the universities; the CONICET was intended as the means by which university researchers would be given full-time posts.

In the 1960s, the University of Buenos Aires, which is the biggest and most important institution in the Argentine university system, was able to organize several high-level research teams in almost all scientific fields, mainly

in the biological and health sciences. The University of La Plata was also able to build a strong synergy with the CONICET and thus reinforced its Humboldtian roots. Other public universities achieved similar good results in the consolidation of their research capacities.

That golden age turned into a crisis in 1966 when military forces interrupted the democratic process. Police forces invaded university campuses, striking teachers, scientists, and students alike. As a result, several of the most renowned scientists and engineers left the country and went into political exile. A very long process of scientific migration for political reasons thus began; this process would be repeated time and again over subsequent years. Argentina’s resulting “brain drain” was far more serious than that of other Latin American countries.

From this point on—and especially during the dictatorial government inaugurated in 1976—the CONICET became detached from the university system. It created its own institutes, and the “career” gradually became an endogenous instrument of the scientific community, rather than a stimulus to university research. Thus the training of researchers became, for more than 30 years, a question that strictly pertained to the CONICET, alienated from the universities. Only in recent years has this trend begun to be reversed, with universities again having high-level researchers. The relationship between the CONICET and the universities has improved, and most CONICET researchers work at university centers. However, the structural malformation remains. Even today, only one-eighth of university teachers have full-time employment status. Low university budgets, resulting in low university salaries, make it difficult to reverse this process—and make full-time employment in academic work unattractive.

During the last 10 years, the Argentine university system has undergone a new process of reform; this is taking place in a rather disorderly fashion, and mainly under the auspices of the federal government, which tends to deprive it of legitimacy in the academic world. Resorting to several legal instruments (the LES and decrees issued according to regulations), specific university programs, and new funding mechanisms in the Argentine university system (FOMECA, for example, which is dealt with below), the government—via the Ministry of Culture and Education—intends to regulate and organize a transition toward a model that is closer to international contemporary tendencies.

The Argentine curricular model has continental European roots and is drawn more from the old French and German models than from Anglo-Saxon tradition. Undergraduate courses are long: theoretically, they take 5, 6, or even 7 years to be completed, depending on the university degree (the real duration of the entire course of study is often even longer). Given such length, curricular content is often equivalent to a 4-year university course plus a master's degree in the Anglo-Saxon model. This explains why development of postgraduate training is very recent; such development is related to the need for an internationally homologous structure rather than to demand for new forms of knowledge.

Until very recently, Ph.D. degrees were restricted to the physical and natural sciences, and only those who wished to take up a scientific career applied for a Ph.D. In the health sciences field, postgraduate studies took on the form of specialization courses. In all other fields, especially those related to professions, postgraduate studies were quite uncommon.

## THE SYSTEM OF HIGHER EDUCATION

Higher education in Argentina consists of a university system and a nonuniversity system (colleges for teacher training, or for humanities, social work, technical, professional, or artistic training). The university system includes the universities and university institutes; these are different from nonuniversity institutes because they are dedicated to a single field. Both types of institutions can be either public or private; in the latter case, however, certification by a public institution is required.

Within the higher education system, it is the exclusive prerogative of university institutions to grant undergraduate degrees (*licenciado* and other professional equivalents) as well as postgraduate master's or Ph.D.

degrees. In keeping with the LES, an undergraduate degree is required in order to be admitted to postgraduate training.

As of May 1998, there were 88 university institutions: 36 national public universities, 22 private universities with permanent authorization, 20 private universities with provisional authorization, and 6 private university institutes. As shown in table 1, although most public universities had already been created at the beginning of this decade, there has been a strong growth in private universities and university institutes; this is a result of the government's 1989 higher education policy to encourage development of the private higher education system.

In 1996, the Argentine university system had 953,801 students. Eighty-five percent studied at public universities, and the rest attended private ones. The number of students in public universities increased by 3.6 percent in the 1993-96 period. The rate of annual growth of private university students is the highest, amounting to 6.5 percent in the 1985-94 period. Over the last decade, the private sector has grown enormously, especially in terms of number of institutions. The student population is still only 15 percent of the total, however. Private universities have a very low impact on the training of scientists and engineers, and are mostly devoted to training for professional careers in the social sciences.

## THE POSTGRADUATE SYSTEM TODAY

### GENERAL FEATURES

Academic postgraduate training is beginning to emerge in Argentina. However, it is highly regulated by laws, government decrees, and university resolutions. According to this series of regulations, there are three

**Table 1. Growth of universities in Argentina, 1990-97**

Institutions	1990	1991	1992	1993	1994	1995	1996	1997
Total.....	60	66	67	69	76	82	87	89
National universities.....	29	29	31	31	33	36	36	36
Private universities with permanent authorization.....	21	22	22	22	22	22	22	22
Private universities with provisional authorization.....	5	9	10	12	17	18	18	20
National university institutes.....	3	4	-	-	-	-	5 <sup>a</sup>	5 <sup>a</sup>
Private university institutes with permanent authorization.....	2	2	2	2	2	2	2	2
Private university institutes with provisional authorization.....	-	-	2	2	2	4	4	4

<sup>a</sup> The National University Institute of Art, created by Decree # 140 (Dec. 3, 1996) is not open at present.

KEY: (-) = not applicable

SOURCE: National Commission for University Evaluation and Certification (CONEAU).

types of postgraduate courses: specializations, master's, and doctorates. Each of these has its own profile and degree; institutional conditions for teaching the postgraduate courses; syllabus characteristics (including number of hours); academic body requirements; and prerequisites concerning equipment, library, document centers, and other related matters.

The LES put into force in 1995 requires that postgraduate degrees be certified. This task has been delegated to an organization created by the LES, the National Commission for University Evaluation and Certification (CONEAU). The LES states that the processes for certifying postgraduate courses must be carried out according to the Ministry of Culture and Education in consultation with the University Council.

In order to certify postgraduate courses, the CONEAU must make a public summons, via the university institutions themselves, and then report to the National Inter-University Council, which comprises the presidents of public universities, and the Council of Private University Presidents. The CONEAU certifies specializations, master's, and doctorates upon the recommendations of expert peer committees.

During the last months of 1997, the CONEAU made the first summons to certify specializations in the health sciences, which mainly comprise postgraduate courses and projects in the fields of medicine and dentistry. Two hundred and ninety-two recommendations have been presented and submitted for approval. In 1998, the rest of the university specialization courses were summoned (251 presentations were received) along with master's and doctorates (which are still open, although it is estimated that there will be 600 to 700 applications).

In law, medicine, dentistry, architecture, engineering, and—to a lesser degree—pharmacy and biochemistry, there are specializations; in agronomy as well as in economics and the administrative sciences, there are master's degrees. In the exact sciences, natural sciences, and humanities—and partly in pharmacy and biochemistry—there are doctorates.

As far as funding is concerned, only 18.8 percent of postgraduate activities receive funding from sources outside the university. This setup is not so different in private universities: few institutes receive funds from large corporations. In general, the financing of postgraduate courses comes from the student's registration fee.

## EXPANSION OF POSTGRADUATE COURSES: MEANS OF REGULATION

The supply of postgraduate degrees in Argentina increased to 1,071 in 1996. This is equivalent to a 35 percent growth in only 2 years. The main growth was in the postgraduate courses offered by public institutions, which amounted to 40 percent. By type of postgraduate course, the segment of greatest growth was the master's degree at almost 70 percent.

If we consider the last 15 years, the total supply of postgraduate courses grew by 234 percent. Besides the quantitative increase, the structure of the supply changed, since specialization and master's courses have multiplied, and the rate of expansion was much greater than that for doctorates. In 1982, there were 205 doctorate courses, master's courses hardly existed, and specialization courses amounted to 97. The present state of affairs is represented in table 2.

**Table 2. Supply of postgraduate courses, 1994 and 1996**

Level	1994			1996		
	Total	Public sector	Private sector	Total	Public sector	Private sector
Total.....	792	518	274	1,071	725	346
Specialization.....	303	216	87	420	290	130
Master's.....	245	151	94	415	290	125
Doctorate.....	244	151	93	236	145	91

SOURCE: Barshy, Osvaldo, *Los posgrados universitarios en la República Argentina* (University Postgraduate Courses in Argentina). Buenos Aires: Troquel, 1997 and National Commission for University Evaluation and Certification (CONEAU).

In comparing the years under consideration (1994 and 1996), the postgraduate system expanded by 38.6 percent in terms of specialization courses and by just under 70 percent for master's; the supply of doctorate courses, on the other hand, fell by 3.27 percent. Table 3 shows the breakdown by field in specialization courses; note the strong prevalence of the health sciences and, to a lesser extent, the law as courses of study.

Out of 681 doctorate and master's courses offered in 1998, only 26 percent (176) were certified by the CONEAU. Of those certified, 93 percent were offered by public institutions, 57 percent are master's courses, and the rest are doctorate courses. It is worth noting that of 145 doctorate courses offered by public institutions, 50 percent have been certified. In the private sector, this proportion amounts to only 3 percent (see table 4).

**Table 3. Specialization courses by field, 1998**

Field	Number of courses	Percent
Total.....	434	100.0
Health sciences.....	249	57.4
Law sciences.....	46	10.6
Administration.....	37	8.5
Pharmacy and biochemistry.....	20	4.6
Engineering.....	14	3.2
Social sciences.....	14	3.2
Education sciences.....	13	3.0
Dentistry.....	11	2.5
Psychology.....	10	2.3
Architecture.....	8	1.8
Farming and agriculture.....	6	1.4
Basic sciences.....	3	0.7
Humanities.....	3	0.7
Total.....	434	100.0
Public institutions.....	377	86.9
Private institutions.....	57	13.1

SOURCE: National Commission for University Evaluation and Certification (CONEAU).

Of the certified postgraduate courses, 41 percent are in the basic sciences; 36 percent are in the technological sciences; and 23 percent are in the social, human, and health sciences (table 5). In both the basic and technological sciences, the largest proportion of certified postgraduate courses are categorized as "A," which means they are at the highest level; in the social, human, and health sciences, the largest proportions are rated as "B" and "C," which means their level is intermediate or incipient.

**Table 4. Certified postgraduate courses - 1998**

Level	Total	Public institutions	Private institutions
Total.....	176	164	12
Master's.....	100	91	9
Doctorate.....	76	73	3

SOURCE: National Commission for University Evaluation and Certification (CONEAU).

**Table 6. A breakdown of the postgraduate course supply by field (percent)**

Field	Total	Specialization	Master's	Doctorate
Total.....	100	100	100	100
Basic sciences.....	13.1	1.9	13.3	29.8
Applied sciences and engineering.....	25	15.6	31.1	30.4
Health sciences.....	26.3	52.7	11	8.8
Social sciences.....	24.3	24.8	30.6	14
Human sciences.....	11.3	5	14.1	17

SOURCE: National Commission for University Evaluation and Certification (CONEAU).

Of the total number of postgraduate courses supplied, about a quarter are in the health sciences, another quarter is in the applied sciences and engineering, and a third quarter is accounted for by the social sciences. The rest of the supply is in the basic sciences and humanities, each of which accounts for about the same proportion (table 6). In the applied, social, and human sciences, there is a predominant supply of master's courses; in the basic sciences, doctorates; and in the health sciences, specialization courses of study.

**Table 5. Certified postgraduate courses in the public system by field, 1998**

Field	Total	A	B	C
Total.....	164	63	64	37
Basic sciences.....	67	30	24	13
Technological sciences.....	59	28	23	8
Social, human, and health sciences.....	38	5	17	16

KEY: A= Postgraduate course categorized as highest level.  
B= Postgraduate course categorized as intermediate level.  
C= Postgraduate course categorized as incipient level.

SOURCE: National Commission for University Evaluation and Certification (CONEAU).

## REGISTRATION AND GRADUATION

Barsky has estimated the number of students registering for postgraduate courses to be 20,180 in 1994, of which 57 percent were master's and doctorate students and 43 percent were students attending specialization courses (table 7). The recent expansion in the supply of courses seems to have had a direct effect on demand, since the available figures now show a more than 50 percent increase. Note, however, that these data are from different sources, and that the 1994 data presented by Barsky come from the certification of postgraduate programs, while the 1997 data are from a census taken by the Ministry of Culture and Education. This would suggest that 1994 data are underestimated and that growth has been slower than that shown in table 7.



During the 1950s and 1960s, Argentina turned out more than 5,000 Ph.D.s per decade; in the 1970s and 1980s, this figure dropped to 3,000. In the current decade, changes in field breakdown have made it difficult to ascertain changes in the number of Ph.D.s by area of study. However, as table 8 shows, the total remains practically constant.

**Table 7. Postgraduate student registration**

	1987	1994	1997
Total.....		20,180	31,914
Specialization.....		8,750	13,165
Master's and doctorates.....	9,006	11,430	18,749

KEY: (-) = not applicable

SOURCES: 1987 and 1994 data are from Barshy, Osvaldo, *Los posgrados universitarios en la República Argentina* (University Postgraduate Courses in Argentina). Buenos Aires: Troquel, 1997 and 1997 data are from the Ministry of Culture and Education.

The Universidad de Buenos Aires is the institution responsible for awarding the largest proportion of postgraduate degrees—41.2 percent.

By field of study, of the 1,129 Ph.D.s trained in the 1989-93 period in the basic and technological sciences, 72 percent received their degrees in the exact and natural sciences, 4 percent in engineering, and 0.2 percent in farming and agricultural sciences (table 9).

By fine field within the basic and technological sciences, most (53 percent) Ph.D.s received their degrees in interdisciplinary areas, 14 percent in pharmacy, and less than 10 percent in chemistry and biology. There were between 4 and 5 graduates per year (2 to 4 percent) in geology, physics, civil engineering, math and computing, astronomy, and chemical engineering. There were also some Ph.D.s in the areas of electrical engineering, geophysics, agronomy, and veterinarian medicine; there were

no Ph.D.s in architecture, communication engineering, industrial engineering, and mechanical and mining engineering during this period (table 10).

## FELLOWSHIPS FOR POSTGRADUATE STUDIES AND RESEARCHER TRAINING

The organization that has usually granted fellowships for training researchers and for postgraduate studies at home and abroad is the CONICET. When new programs, such as the Fund for the Improvement of University Quality (Fondo para el Mejoramiento de la Calidad Universitaria—FOMEC), were put into effect, CONICET participation decreased; it has, however, managed to keep up a high percentage of fellowships, especially for all postgraduate studies carried out in the country. Recently, the Ministry of Culture and Education created a program for postgraduate training (PROFOR), which also grants fellowships for postgraduate studies abroad and administers programs together with the Fulbright Foundation and the Ministry of Education/Coordination for the Improvement of Higher Education Personnel from Brazil. Other organizations have their own postgraduate training policy in their area of competence, such as the National Institute for Public Administration, the National Institute of Farming and Agricultural Technology, and the Universidad de Buenos Aires itself, among others.

## THE CONICET

The CONICET was created February 5, 1958, with the aim of orienting, fostering, and subsidizing scientific and technological research, as well as supporting activities in both the public and private sectors. It also aims to foster scientific cooperation and exchange at home and abroad.

**Table 8. Graduates from doctorate courses**

Field	1950-54	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-88 <sup>a</sup>	1989-93 <sup>b</sup>	1996 <sup>c</sup>
Total.....	2,578	2,603	2,462	2,745	1,983	1,391	1,534	1,146	1,402	347
Basic sciences and technology.....	764	583	542	504	750	650	684	676	1,129	228
Social sciences.....	471	449	279	508	341	181	145	79	111	61
Human sciences.....	44	26	32	33	66	46	77	41	101	27
Medical sciences.....	1,299	1,545	1,609	1,700	826	514	628	350	61	31

<sup>a</sup> Note that this is a 4-year period, rather than 5 as elsewhere.

<sup>b</sup> In this period, changes were made in the disciplinary breakdown.

<sup>c</sup> These are the last available data

SOURCES: Data for 1950-93 are from Barsky, Osvaldo, *Los posgrados universitarios en la República Argentina* (University Postgraduate Courses in Argentina). Buenos Aires: Troquel, 1997; 1996 data are from the Ministry of Culture and Education.

**Table 9. Graduate degree recipients by field of study and type of degree, 1989-93**

Field of study	Total	Specialization	Master's	Doctorate
Total.....	6,500	3,847	1,251	1,402
Basic sciences and technology.....	2,594	1,202	263	1,129
Agricultural and farming sciences.....	197	0	195	2
Architecture.....	52	52	0	0
Engineering.....	1,233	1,147	37	49
Exact and natural sciences.....	835	-	19	816
Biochemistry, pharmacy, chemistry.....	277	3	12	262
Social sciences.....	2,456	1,404	941	111
Administration and economics.....	1,727	950	764	13
Law and political science.....	688	415	177	96
Other.....	41	39	0	2
Humanities.....	107	4	2	101
Philosophy and literature.....	65	-	1	64
Education.....	3	0	0	3
Other.....	39	4	1	34
Medical sciences.....	1,343	1,237	45	61
Medicine.....	1,237	1,163	45	29
Dentistry.....	82	50	0	32
Health sciences.....	24	24	0	0

SOURCE: Barsky, Osvaldo, *Los posgrados universitarios en la República Argentina* (University Postgraduate Courses in Argentina). Buenos Aires: Troquel, 1997.

**Table 10. Ph.D.s in basic and technological sciences, by fine field, 1989-93**

Fine Field	Ph.D. graduates	Percent
Total.....	1,129	100
Astronomy.....	22	1.9
Biology.....	88	7.8
Physics.....	37	3.3
Geophysics.....	1	0.1
Geology.....	47	4.2
Math and computing.....	24	2.1
Chemistry.....	102	9.0
Agronomy.....	1	0.1
Veterinarian medicine.....	1	0.1
Civil engineering.....	26	2.3
Communication engineering.....	0	0.0
Electrical engineering.....	3	0.3
Industrial engineering.....	0	0.0
Mechanical engineering.....	0	0.0
Mining engineering.....	0	0.0
Chemical engineering.....	20	1.8
Architecture.....	0	0.0
Pharmacy.....	160	14.2
Interdisciplinary.....	597	52.9

SOURCE: Barsky, Osvaldo, *Los posgrados universitarios en la República Argentina* (University Postgraduate Courses in Argentina). Buenos Aires: Troquel, 1997.

To meet these objectives, the CONICET, like its counterpart science-promoting agencies around the world:

- sponsors Scientific and Technological Researcher Career and a Staff Support Career (R&D);
- provides assistantships and fellowships for the training of university graduates or for doing specific research work at home or abroad;
- subsidizes and fosters scientific technological research aimed at achieving scientific and technological progress, and supports activities for this kind of research, in both the public and private sectors;
- fosters scientific and technological exchange and cooperation at home and abroad; and
- provides organization and subsidies for institutes, laboratories, and research centers, which usually operate in universities and other private or public institutions, or even within the CONICET itself.

For a long time, the CONICET was the only entity that gave fellowships for the training of researchers and highly qualified human resources both at home and abroad.

However, the training of researchers did not necessarily involve acquiring a postgraduate degree. The reason for this was that there was a very limited tradition of doctorate studies in Argentine universities; and—on the other hand—a certain “patriarchal” or magisterial culture in Argentine science, according to which the training of new researchers was conceived of as the practice of researchers working with a master or being included in a research team. This process included a “beginner” level and an “updating” level. The fellowships granted by the CONICET were either of these two types. They did not necessarily require obtaining a Ph.D. degree, not even when they were granted to train researchers abroad.

The fellowships offered by the CONICET for the training of researchers were considered a practically indispensable prerequisite for entry into a “researcher career”; thus, the CONICET tried to regulate the number of fellowships to be given every year according to the vacancies available in the course of studies. In those years when entering this course was highly restricted, conflicts arose with the fellows whose aspirations were frustrated. The negative consequences of this situation ultimately have affected the researcher career itself, bringing about an overall aging of the researcher staff roster. This situation changed in 1997, when entry to the course was expanded; the course has since been enlarged by almost 20 percent.

The fact that the CONICET did not require a doctorate of its fellows complied with the policy of regulating the number of fellows according to registration, and limited the number of fellowships the organization offered. Since, in practice, the fellowships stretched out much farther than the previously established 4 years, it was quite usual for a CONICET fellow to remain for up to 7 years (and sometimes even longer) in the status of a researcher-trainee. Obviously, this reduced the organization’s capacity to give other fellowships due to budget limitations.

The reordering of the higher education system and of the fellowship system are solutions that have been tried during the past years to put an end to this problem. At present, fellows must have a postgraduate degree, and a Ph.D. is now necessary to enter the researcher career. The CONICET has finally created fellowships for postgraduate studies that do not necessarily involve the training of a researcher, with a wider criterion of what is known as high-level human resources.

Among the innovations in the CONICET fellowship system are postdoctorate fellowships in corporations as a way of including trained researchers in the productive

sector. Also, the CONICET has created a system of fellowships to strengthen the technological development of skills and the transfer of technology.

## THE FOMECC

The Fund for the Improvement of University Quality, created in 1995, was designed to provide financial support for reform processes and to improve the quality of national universities. Improving the level of postgraduate courses offered by Argentine universities is one of the central aspects of the FOMECC program; with this program, both the supply (through the support of certified courses) and the demand (through fellows for young teachers) are funded. Funding to strengthen supply only applies to state universities, since Argentina does not subsidize the private sector university system except in the research area.

Before the LES was given legal force, rules were established and practices developed to evaluate postgraduate courses, since the FOMECC needed a mechanism to assess and certify the supply of postgraduate courses in order to fund their development according to their level of certification. In 1995, the Commission for the Certification of Postgraduate Courses (Comisión de Acreditación

**Table 11. Fellowships given by the FOMECC, 1995-97**

Level of study	Total	At home	Abroad	Mixed
Total.....	1,780	1,007	705	68
Master's.....	805	501	304	
Doctorate.....	675	368	239	68
Postdoctorate.....	207	45	162	

SOURCE: Fondo para el Mejoramiento de la Calidad Universitaria (FOMECC).

de Posgrados) was created, which carried out the first process of certification. In this first experience, 27 percent of master’s and doctorate courses offered in the country were certified, qualified, and classified into three ranks: A, B, and C. Postgraduate courses certified as A—and, exceptionally, those ranked as B—were authorized to admit fellows funded by the FOMECC program.

## FELLOWSHIPS FOR POSTGRADUATE COURSES

In 1997, there were 3,824 fellows in Argentina attending postgraduate courses with fellowships provided by national organizations (table 12). One-third of the fel-

lowships awarded (32 percent) were for studies abroad; the remaining 68 percent were for postgraduate studies pursued in the country.

Fifty-one percent of the fellowships (1,940) were given or administered by the Ministry of Culture and Education; 47 percent (1,783) were granted by science and technology organizations; and 2 percent were from other offices of the national administration, mainly for the training of the staff itself or for a diplomatic course of studies.

Contrary to the trend of increasing enrollment for postgraduate courses in Argentina, the CONICET fellowships, traditionally a major institution in this matter, decreased between 1993 and 1998 from 1,926 to 1,210—a 37 percent drop (table 13). The reasons for this decline

**Table 12. Total active fellows, 1997**

Total.....	3,824*
<b>Ministry of Culture and Education</b>	
FOMECE.....	1,687
International Co-operation.....	170
PROFOR.....	52
PROFOR/FULLBRIGHT.....	11
CAPESE, Brazil.....	20
<b>Science and Technology Organizations</b>	
CONICET.....	1,210
INTA.....	120
CNEA.....	47
INTI.....	6
UBA CyT.....	400
<b>Others, Public Administration</b>	
ISEN.....	40
AFIP.....	40
ISEG.....	15
INAP.....	6

**NOTE:** \*This figure must be interpreted as stock, since it stands for the number of postgraduate students whose fellowship was in force, regardless of the year it started.

**SOURCE:** National Council of Science and Technology Studies (CONICET).

are outlined above. The 1995 creation of the FOMECE as an entity that also provides grants greatly increased the supply of fellowships and seems to have compensated for this drop.

## FELLOWSHIPS TO STUDY ABROAD

Most of the 1,210 fellows studying abroad in 1997 were funded by the FOMECE (64 percent); the next larg-

est sources of fellowships were those provided as part of the international cooperation mechanisms sponsored by the Ministry of Culture and Education, and CONICET fellowships to study abroad.

**Table 13. CONICET: number of fellows, as of last month of each year**

Level	1993	1994	1995	1996	1997	1998
Total.....	1,926	1,970	1,764	1,705	1,503	1,210
Beginner.....	622	523	548	571	523	529
Updating.....	1,013	1,251	664	544	569	537
Postdoctoral.....	2	2	540	578	411	144
Others.....	289	194	12	12	0	0

**SOURCE:** National Council of Science and Technology Studies (CONICET).

**Table 14. FOMECE: fellowships to study abroad and mixed fellowships, 1995-98**

Level	Basic sciences and engineering	Social, human, and health sciences	Total
Total.....	508	265	773
Master's.....	145	159	304
Doctorate.....	213	94	307
Postdoctorate..	150	12	162

**SOURCE:** Fondo para el Mejoramiento de la Calidad Universitaria (FOMECE).

## FOMECE Fellowships

Out of the 773 FOMECE fellowships provided for study abroad, 40 percent are for doctorates, 39 percent for master's, and 21 percent for postdoctorates (table 14).

Two-thirds of the fellowships are for basic science and engineering courses (primarily in doctorate programs). One-third is allotted to the social, human, and health sciences (primarily in master's programs). Most postdoctorate fellowships are in the basic sciences and engineering.

## CONICET Fellowships

Of the 94 CONICET fellowships to study abroad still in force, 38 percent are for fellows pursuing doctorates in the United States, 18 percent in Great Britain, and 15 percent in France; the remaining fellowships are for doctoral study in Spain, Holland, Germany, Australia, Canada, and Italy (table 15).

These figures can be correlated to a great extent to the proportion of publications coauthored by Argentine

and foreign scientists. Of the publications produced in collaboration with other countries between 1991 and 1995 and recorded in the Science Citation Index, 38 percent

**Table 15. CONICET: fellows studying abroad by country (as of August 31, 1998)**

Country	Fellows	Percent
Total.....	94	100
Australia.....	2	2
Canada.....	2	2
France.....	14	15
Germany.....	4	4
Great Britain.....	17	18
Holland.....	8	9
Italy.....	2	2
Spain.....	9	10
United States.....	36	38

SOURCE: National Council of Science and Technology Studies (CONICET).

had U.S. coauthors; 15 percent had Spanish coauthors; 13 percent each had French and Brazilian coauthors; and 12 percent were collaborations with German authors.

Fifty-nine percent of the CONICET fellowships abroad correspond to stipends for postdoctoral courses and 40 percent for doctorate courses. The postdoctoral courses are mostly in the natural and exact sciences. In the social sciences and humanities, there is a prevalence of doctorates.

Thirty-nine percent of the fellowships abroad are for the natural and exact sciences, followed by the technological sciences (19 percent), social sciences (15 percent), farming and agriculture (13 percent), humanities (10 percent), and medical sciences (4 percent).

## FELLOWSHIPS IN THE COUNTRY

There are a total of 2,614 fellows doing postgraduate work in Argentina with grants provided by public institutions; of these, 1,116 (43 percent) were granted by the CONICET and 914 (35 percent) by the FOMECA. A significant amount of fellowships was awarded by the Universidad de Buenos Aires, which contributes toward postgraduate studies; these awards do not necessarily imply course attendance (i.e., the recipients might be doing research only).

**Table 16. CONICET fellowships abroad in force as of August 31, 1998**

Field	Total	Master's	Doctorate	Post-doctorate
Total.....	94	1	38	55
Agricultural sciences.....	11	1	6	4
Biological sciences.....	11	-	-	11
Engineering and technology...	10	-	6	4
Physical sciences.....	8	-	-	8
Chemical sciences.....	7	-	-	7
Chemical engineering.....	6	-	1	5
Earth sciences.....	6	-	-	6
Economics.....	5	-	5	-
Math and computing.....	5	-	2	3
Medical sciences.....	4	-	1	3
Sociology.....	4	-	4	-
Law.....	3	-	3	-
Philosophy.....	3	-	3	-
History.....	3	-	2	1
Architecture.....	2	-	2	-
Political sciences.....	2	-	1	1
Anthropology.....	1	-	-	1
Philology.....	1	-	1	-
Linguistics.....	1	-	1	-
Veterinarian sciences.....	1	-	-	1

KEY: (-) = not applicable

SOURCE: National Council of Science and Technology Studies (CONICET).

## CONICET Fellowships

Of the CONICET's 1,210 active fellowships, 92 percent are local fellowships. Of these, 47 percent are beginner fellowships, which are mainly for master's courses; 45 percent are fellowships for advanced courses through doctorates; and 8 percent are fellowships to take postdoctorates (table 17).

By field, 49 percent of the CONICET fellowships (547) are in the exact and natural sciences, where updating fellowships prevail; 16 percent (175 fellowships) are in the technology area, where both beginner and updating fellowships prevail; 15 percent (171 fellowships) are in medical sciences, with an equal amount for beginner and updating courses; 9 percent are in the humanities with a net prevalence of beginner fellowships; 6 percent are in the social sciences, which are mostly for beginner fellow-

**Table 17. CONICET, total fellowships as of May 1998**

Field	Total	Beginner	Updating	Post-doctorate
Total.....	1,210	529	537	144
Medicine.....	175	75	72	28
Biology.....	160	63	72	25
Chemistry.....	156	61	77	18
Physics.....	116	42	62	12
Earth.....	112	45	49	18
Chemical Engineering.....	100	33	54	13
Agronomy.....	66	33	30	3
History.....	60	36	21	3
Engineering.....	58	33	23	2
Sociology.....	45	27	16	2
Math.....	40	15	19	6
Architecture.....	35	18	12	5
Literature.....	24	13	10	1
Philosophy.....	23	12	5	6
Law.....	22	14	7	1
Economics.....	14	6	7	1
Others.....	4	3	1	0

SOURCE: National Council of Science and Technology Studies (CONICET).

ships; and 5 percent (55 fellowships) go to the agricultural sciences, with a slight predominance of beginner fellowships.

### FOMEC Fellowships

Out of the FOMEC's total 1,687 fellowships, 914 (54 percent) are for local fellowships. Of these, 377 are open grants directly allocated to the postgraduate courses (table 18). Fifty-five percent of the local fellowships are for master's degrees, 40 percent for doctorates, and 5 percent for postdoctoral degrees. This same scheme, with

**Table 18. FOMEC local fellowships, 1995-98**

Level	Total	Basic sciences and engineering	Social, human, and health sciences
Total.....	914	695	219
Master's.....	501	358	143
Doctorate.....	368	298	70
Postdoctorate.....	45	39	6

SOURCE: Fondo para el Mejoramiento de la Calidad Universitaria (FOMEC).

some slight differences, applies to the basic sciences and engineering, and to the social, human, and health sciences.

**Table 19. FOMEC fellowships granted by field, 1995-98**

Total.....	1,687
Subtotal, Basic Sciences and Engineering.....	1,140
Biology.....	83
Physics.....	113
Computing.....	89
Math.....	93
Chemistry.....	97
Engineering courses.....	251
Farming and agriculture sciences.....	301
Other basic sciences.....	113
Social, Human and Health Sciences.....	547

SOURCE: Fondo para el Mejoramiento de la Calidad Universitaria (FOMEC).

The exact and natural sciences account for 28 percent of the total FOMEC fellowships; farming and agricultural sciences, 18 percent; engineering, 15 percent; and the social, health, and human sciences, the remaining 32 percent (table 19).

## FINAL REMARKS

Postgraduate studies and the training of researchers in Argentina have traditionally been shaped on a peculiar model that is hard to compare with that of countries that have adjusted their higher education systems to the Anglo-Saxon tradition—more specifically, to the American model.

Having a curricular model that is long and grants degrees called *Licenciaturas* (similar to a bachelor's degree in Britain), postgraduate careers have not become widespread or properly rooted in the Argentine universities, except in the exact sciences and specializations in the field of medicine. The scientific system has been geared toward training researchers through apprentice-master relationships rather than via formal doctorate studies. Added to this is the country's relatively low level of industrialization, which is manifested in a low demand for highly trained engineers.

Recently, the situation has begun to change, more due to government pressure than to societal demands. The prevailing criterion in these recent changes is to adjust Argentina's educational and scientific systems to new international trends. This process is just beginning and has little legitimacy inside the academic world; moreover, under the present circumstances, it is very disorderly. However, it is possible to consider the expansion of graduate education as a trend to be strengthened in the future.

There are not enough data available to assess the international mobility of scientists and engineers in Argentina. Nevertheless, in examining co-publications, it can

be noticed that only 23 percent of the articles by Argentine authors in the Science Citation Index in the period between 1991 and 1995 are done in collaboration with other countries (Fernández, Gómez, and Sebastián 1998). This figure is by far the lowest in Latin America. There are two main reasons for this fact. The first is that the Argentine scientific community is isolated from the rest of the world, mostly due to a lack of policy instruments facilitating international mobility. The second derives from the greater degree of autonomy and maturity of the Argentine scientific community, mainly because of its longer tradition as compared to other Latin American countries.





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