

Lino Barañao, "Regional Scientific Education and the Integration of Latin America: A Perspective from Argentina," *Science & Diplomacy*, Vol. 5, No. 3 (September 2016).
<http://www.sciencediplomacy.org/perspective/2016/regional-scientific-education-and-integration-latin-america>

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Regional Scientific Education and the Integration of Latin America: A Perspective from Argentina

Lino Barañao

SCIENCE can be a useful tool for improving international relations within regions, including Latin America. There have been some experiments aimed at testing whether education of Latin American scientists under a new paradigm can contribute toward strengthening regional and global integration in the region. Specifically, it is worth delving into two initiatives—the International Institutes for Interdisciplinary Innovation (I4) and the Latin American Center for Interdisciplinary Formation (CELFI)—aimed at creating environments in which young Latin American scientists can establish personal bonds that can lead to future scientific cooperation at a regional level. At the same time, these initiatives should promote the sense of social responsibility that is not usually emphasized in the scientific centers of excellence in developed countries.

The Role of Science in Integration of Latin America

In contrast with other forms of culture, technologies have been able to cross ethnic boundaries. It seems clear that mastering new weapons, controlling fire, or being able to farm provided adaptive advantages. In fact, it has been proposed that the demise of our cousins, the Neanderthals, was due to their inability to incorporate some of the improvements in the hunting tools developed by the

coexisting modern humans. Therefore, even from our ancient pasts, knowledge, together with commercial goods, has been a subject of exchange between nations.

On the other hand, scientists belong to a peculiar sociological group with ties that span across national borders. An Argentinean scientist might have a more fulfilling conversation with a Chinese colleague than with his or her next-door neighbor. This might explain the advantage of science as a tool for initiating and consolidating diplomatic relations.

In spite of the common history, language, and cultural background, Latin America remained as a group of nations with a low vocation for integration and conflicts that sometimes escalated into wars until the recent past. In the period of the independence wars against Spain, the idea of an integrated subcontinent was held by leaders belonging to secret societies.¹

Thus, the forefathers of Latin American independence, such as Simon Bolivar and José de San Martín, held a common ideal of regional integration that would have led to a confederation similar to that of the United States. However, the interests of the local leaders prevailed and the subcontinent ended up divided into multiple countries. While these countries shared a language and culture, they failed to develop consistent political and economic ties.²

Although efforts have been made in terms of achieving some degree of regional integration, such as the Mercosur (a sub-regional block that includes Argentina, Brazil, Paraguay, Uruguay, and Venezuela, as full members as well as Bolivia, Chile, Colombia, Ecuador, Peru, and Suriname as associate members), these efforts are still insufficient compared with the potential of a greater common area.

The attempts to achieve a greater regional integration have been more successful in the scientific area. Entities such as Ibero-American Programme for Science, Technology and Development (CYTED) and the Inter American Institute for Global Change Research (IAI) were able to consolidate networks of Latin American scientists that produced information relevant to local and global problems.³

In this context, Latin American scientists could play a similar role of that of the intellectual leaders during the independence period. Scientists, as commented above, can easily communicate with each other and share a worldview regardless of the differences in their origins. They are also more aware of the global problems and the need for international cooperation to effectively solve them.

Therefore, science can constitute the basis for the future political integration of the region. However, profound changes should be introduced in the education of the new generations of scientists if we want them to fulfill this expectation.

Until now, the norm in Latin American countries has been to send graduate students or postdocs to centers of excellence, usually in Europe or the United States. This has been extremely satisfactory in terms of access to the forefront of science in the different areas of research. This strategy has also allowed a continuous update of the technologies used in their countries of origin, provided special conditions

required for repatriation are implemented. Otherwise, this policy leads to a brain drain.

In Argentina, thanks to a unique program called “RAICES” (which stands for “roots”) that provides special contracts and grants to those professionals willing to return, we have succeeded in repatriating more than 1,300 Argentinean scientists. This program also maintains a network of five thousand Argentinean professionals working abroad; these investigators receive weekly information about events and programs taking place in our country. Moreover, we have established a special initiative providing for joint grants that link them with the local scientific community.

In spite of the above-mentioned benefits, education of the scientific labor force in developed countries has two pitfalls.

First, scientists in developed countries have production of knowledge as their sole responsibility. The conversion of this knowledge into wealth is carried out by a productive system that depends on innovation to maintain competitiveness. In those countries, for example in the United States and Israel, governments and/or the private sector are also able to make an effective use of the resulting technologies.

However, in Latin America we need a different type of scientist. Like the Roman god Janus, they need to have two faces. One face shall look outward to the frontiers of competitive science and the other shall focus inwards, searching for means to improve their fellow citizens’ quality of life. This latter insight is not usually learned in the centers of excellence of the Northern Hemisphere and is related to scientists’ social responsibility.

In Argentina, the vast majority of the scientists graduate from public universities that are state-funded and free. Therefore, although they do not have financial debts, they should have an ethical debt to their community.

However, when students study abroad, they end up having professional and personal acquaintances with scientists from different countries, and less of a link to their community of origin. If the number of researchers per country is considered, it is more likely that a Latin American scientist will meet a Chinese or Norwegian citizen than someone from his or her own region. This, in turn, will make it more likely that the potential future collaborations will not include other Latin American scientists. Of course, this also implies that the subject of such collaborations will most likely deal with the mainstream topics of a given field rather than with problems that are relevant to the country of origin.

In order to address this issue, our ministry created two institutions to foster local education of Latin American scientists in close contact with globally recognized scientists from the region and the Northern Hemisphere: the International Institutes for Interdisciplinary Innovation (I4) and the Latin American Center for Interdisciplinary Formation (CELFI)

International Institutes for Interdisciplinary Innovation (I4)

I4 was created to provide an environment of interaction for scientists from different countries who are working in different disciplines. It is located in the same venue that houses the ministry, the “Scientific Hub,”⁴ which also includes the National Agency for the Promotion of Science (the main funding agency for science and innovation), the National Council for Scientific and Technical Research (CONICET), and the Cultural Center for Science, devoted to the popularization of sciences.

In order to belong to the I4, an institute must have an international partner. The I4 is composed of the following institutes:

- The Biomedicine Research Institute of Buenos Aires (IBioBA, the only partner institute of the Max Planck Society in Latin America);
- the Center for Bionanosciences (associated with the Ibero-American Center for Nanotechnology);
- a laboratory from the International Centre for Genetic Engineering and Biotechnology (ICGEB) in Trieste, Italy;
- the “Tomás Maldonado” International Knowledge Design Centre (formed by our ministry and a consortium of five Italian universities⁵);
- a Center for Supercomputing and Engineering (CSC, associated with the Centre National de Recherche Scientifique [CNRS] of France); and
- the Interdisciplinary Centre for Science, Technology and Innovation (CIECTI, which is a counterpart of the Centro de Gestao e Estudos Estrategicos of Brazil.

Interaction between scientists and students in the I4 is promoted by seminars and joint meetings. These events are usually attended by Latin American fellows. This environment has proven to be very effective in promoting interdisciplinary interactions and international cooperation. In addition, joint projects have been developed between institutes that deal with problems of the productive sector and/or socially relevant issues. Some of the projects deal with new patient interphases, novel approaches to cancer treatment, and graphic design applied to biological models. All of these projects started with a chance interaction between members of the different institutes and the researchers obtained funding from international cooperation programs. On average the number of non-Argentinean scientists in the I4 is still low (about 5 percent) but it is growing and is far greater than the proportion in typical research institutions in Argentina.

The existence of these joint initiatives has also strengthened the national presence of the countries involved, particularly in the case of Germany and Italy. In addition to the visits from heads of states and higher authorities to research institutions, the private sector has increased its involvement in binational activities.

The German-Argentinean Chamber of Commerce has sponsored a joint program of education between German and Argentinean universities and the “Science Tunnel” exhibit from the Max Planck Society that was on display at Tecnópolis, an annual fair in Buenos Aires. In the case of Italy, our ministry has recently signed a memorandum of understanding with Confindustria (the Italian industrial unions) aimed at promoting investments in the agri-food sector in Argentina.

Latin American Center for Interdisciplinary Formation (CELFI)

The idea behind the creation of this center was to provide an environment in which young scientists from Latin America could bring problems with such complexity that cannot be tackled by a single discipline. This common space should also provide opportunities for students and scientists to share experiences and to develop personal bonds that could be the basis of future collaborations.

This initiative consists of a program of fellowships and the construction of a dedicated new building in the campus of the University of Buenos Aires School of Sciences. Both components are funded by a loan granted by the CAF (Banco de Desarrollo de América Latina).

This center is in fact the first of a series of similar institutions, each with a particular focus. The first one, CELFI-Data, is focused in information theory in its different applications: computer science, big data, bioinformatics, molecular biology, and neurosciences. So far, CELFI-Data has organized thirteen courses that were attended by more than 260 students and scientist from nineteen Latin American countries. The second institution will focus on sustainability and will be located at the National University of Córdoba.

A wider proposal submitted to the Organization of Ibero-American States (OEI) aims at reproducing this experience in order to create an Ibero-American network of interdisciplinary research and training centers that would allow an exchange of students and scientists at a regional level.

In addition to its expected outcome in terms of educating Latin American scientists, promoting future scientific networks, and solving problems that are relevant in the region, I expect that the CELFI will contribute toward increasing originality in scientific research.

In his book “The Structure of Scientific Revolutions,” Thomas Kuhn stated that major transforming discoveries had been done by either young scientists or scientists who were new to the discipline. Thus, it seems likely that this combination of established scientists, working in interdisciplinary fields, with young Latin American students, bringing novel ideas, might produce some innovative contributions.

Importance of Long-Term National Policies in Science and Technology

Finally, it is also important to initiate and maintain long-term policies that promote strong international partnerships that could be the basis of efficient science diplomacy.

The Argentine Ministry of Science, Technology and Productive Innovation is unique in that it has had the same staff since its creation in 2007, which is unprecedented in Latin America, where most ministry staffs turnover with each new administration. Furthermore, we have been working with the majority of the administrators since my original appointment as president of the National Agency for the Promotion of Science and Technology in 2003. This means that we were able to work under the administrations of three different presidents, namely Néstor Kirchner, Cristina Fernández de Kirchner, and Mauricio Macri. The continuity of the public policies in science contrasts with the usual situation in most Latin American countries where ministers of science change with a new administration. In this context, it is worth noting that the president of the CONCYTEC (Consejo Nacional de Ciencia, Tecnología e Innovación) in Peru, Gisella Orjeda, has also retained her position after the recent change in the government. Hopefully this is an indication of a new trend in the region.

The last transition between two governments of different political parties was particularly unusual. My reappointment was not only proposed by the newly elected president but also endorsed by the former one. Although there is no recipe for assuring this type of continuity, several factors seem to have contributed.

- From 2003 to 2015, our ministry's budget increased by almost tenfold, leading to a 39 percent growth in the number of full-time researchers and a concomitant rise in the amount of grants and square meters of laboratory space built all over the country. This was mainly the result of the understanding that both Kirchner and Fernández had on the importance of science and technology to promote social and economic development.
- Technology transfer was promoted through the funding of public-private consortia that in many cases led to new products in the market.
- The Science, Technology and Innovation Plan 2013-2020 was the result of a consensus of more than 1,500 specialists and representatives of different sectors.
- Active promotion of science in all the provinces was done without distinctions based in the political affiliation of the governors.
- Since 2003, we have received funding from different multilateral organizations such as the Inter-American Development Bank, the World Bank, and the Latin American Development Bank, among others. We have been able to receive a high level of recognition not only in terms of efficiency and productivity, but

also in the ability to innovate in terms of the instruments used to promote both basic research in the public sector and innovation in private companies.

All the precedent factors led to strong support from both academia and industry that undoubtedly was taken into account by the new government when it decided to carry on with the current science policies and the renewal of my appointment.

Science diplomacy is called to play a pivotal role in the management of foreign affairs in this century. In the case of Argentina, scientific cooperation has contributed to the consolidation of long standing interactions that can overcome the gaps associated with changes in governments. In fact, it is a usual practice by our ambassadors to start with a scientific mission after they arrive to a new destination because it is usually an area devoid of potential conflicts.

I hope that our experiences in Argentina might provide useful insights to consolidate a more intense scientific partnership in Latin America, which will in turn facilitate a superior political integration in the region. **SD**

Endnotes

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