

## Science communication practices at the National Autonomous University of Mexico

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### Abstract

The National Autonomous University of Mexico (UNAM) is one of the world's single largest employers of science communicators, with over 350,000 students and 40,000 staff. Its science communication activities include five museums (Universum, Museo de la Luz, the Geology Museum, Museo de la Medicina Mexicana and Museum of Geophysics), botanical gardens, as well as a wide range of cultural and outreach activities. It has several programmes for training professional science communicators. The science communication staff are spread across the campuses in Mexico City and four other cities, including writers, explainers, researchers, evaluators, who produce exhibitions, magazines, books, theatre, screenings and science cafés. This activity is diverse and sometimes operates to different agendas.

### Keywords

Popularization of science and technology; Professionalism, professional development and training in science communication; Science communication in the developing world

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### Introduction

The founder of the National Autonomous University of Mexico (UNAM), historian Justo Sierra, declared that "a university is a centre where science is shared with the population". Thus, the dissemination of knowledge became one of the three substantive functions of the university along with teaching and research from the start [Dominguez, 2009]. UNAM was established in 1929, having grown out of the National University of Mexico (founded 1910), whose origins in turn go back to 1551 when Philip II Spain authorized its foundation.

Half of the 262-hectare site of UNAM in the southern part of Mexico City comprises the Ecological Reservation of the Pedregal of San Ángel, a unique ecosystem embedded in the lava rock of a volcano that erupted over 2,000 years ago. In 1959 the second oldest and most important botanical garden in Mexico was inaugurated here, exhibiting a wide variety of Mexican plant biodiversity, which serves the double purpose of teaching and research.

Over the last 20 years, UNAM has opened campuses in other areas of Mexico City as well as in six capital cities of the states of Baja California, Querétaro, Guanajuato,

Michoacán, Morelos and Yucatán. The university also has facilities for all kinds of sports and cultural activities which includes theatres, concert halls, museums and a wide range of outreach activities. UNAM is equivalent to a city, with over 350,000 students and 40,000 employees.

### Luis Estrada's key role

A small group of UNAM scientists and students under the leadership of physicist Luis Estrada is credited with initiating the modern era of the public communication of science in Mexico. In 1968 they started a popular science magazine, *Física* (Physics), which later became *Naturaleza* (Nature) with the purpose of covering a large range of scientific topics [Reynoso and Franco, 2015]. The production of this magazine served as a workshop for science communicators and for analysis of science communication [Estrada et al., 1981].

In 1980, Estrada created the Experimental Programme for Science Communication which a year later became the University Centre for Science Communication (CUCC-Centro Universitario para la Comunicación de la Ciencia), the first university unit dedicated to science communication. A few years later, the CUCC increased its staff considerably in order to develop the science museum Universum, inaugurated in 1992. The Museo de la Luz (Museum of Light) opened in 1996 and other museums around Mexico and temporary and travelling exhibitions followed. The mission of Universum is to contribute to the construction of a scientific culture for the population and to promote an interest in science and technology. The Museo de la Luz in the historical centre of Mexico City combines science, art and history using light as a thematical axis.

These centres operate under the Directorate-General of Science Communication (Dirección General de Divulgación de la Ciencia- DGDC) which employs about 700 people, of whom around 100 work exclusively as science communicators and 250 are students working as museum guides. The rest of the staff perform academic activities or administrative, technical and maintenance tasks. Along with its museums, the DGDC uses radio, television and internet to communicate science, also direct communication in the form of talks, demos, theatre, science fairs and outreach activities; a popular science magazine called *¿Cómo ves?* (What do you Think?) for young people, which in 2002 received the Latin American Prize for the Popularisation of Science and Technology awarded by RedPop (The Popularization Network of Science and Technology in Latin America and the Caribbean) and UNESCO; science workshops, a summer course for children and courses for teachers; collaborations with different research institutes as well as other science museums in Mexico and abroad. The DGDC also conducts research in science communication and offers formal training programmes for science communicators [Sánchez-Mora et al., 2015].

UNAM established the Museum of Medicine in 1980 in Mexico City, renewing and expanding it in 2012. The Museum of Geophysics opened in 2010 on the site of the old Central Seismological Station of Tacubaya. This museum displays the instruments that are used by earth scientists to analyse earthquakes and other natural phenomena such as volcanoes, tides and solar activity [El Universal, 2015]. These museums function independently, while the Botanical Garden and Universum enable closer interaction with the academic community and the students because they are on the university grounds.

Over the past two decades, the DGDC has produced a series of book and magazines, including several collections on various science topics for the general public and for children, and a collection, *Divulgación para divulgadores* (Popularisation for popularisers) for professionals in the field. Other units in UNAM also publish popular science magazines; the most notable of these is *Ciencias*, published by the School of Science since 1980. Some departments and institutes have created their own science communication units, the first these being the Biomedical Research Institute, whose Press and Dissemination Office was opened to inform the academic community of the university as well as society in general about activities, programmes, achievements and challenges in biomedical research and experimental biology [Frías and Rueda, 2014]. Almost a decade later, in 2004, the Institute of Astronomy opened a Dissemination Office based on a persuasion strategy, aimed at positioning science, and astronomy in particular, on the public agenda in a competitive and convincing manner [Frías and Rueda, 2014]. The International Year of Astronomy in 2009 was a crucial and massive event that gave an impulse to the activity of science communication in the Astronomy Institute at UNAM. Since then, a national event, *The Night of Stars*, takes place every year in more than 90 places all over the country.

### Spreading the activities

In 2005 the Institute for Nuclear Science started a Dissemination and Outreach project. Then came the Centre for Ecosystem Research's *Unidad de Vinculación* (Linkage Unit) on the UNAM campus in Morelia. Today, practically all academic and research centres on the Morelia campus have personnel dedicated to cultural and science communication activities. Several public events are offered each year such as the *Night of the Stars*, the *Mathematics Fair of Morelia*, the *Children's Fair of Sciences and Arts*, the film cycle on science, the *Science and Humanities Festival*, science cafés and guided visits to the campus. In Ensenada, Baja California, in the north-western region of Mexico, UNAM began the *National Festival of Knowledge* in 2011 "to celebrate knowledge and make it accessible to all audiences" by means of exhibitions, artistic performances, concerts, workshops, scientific dissemination conferences, round tables and literature. The festivals have also had events in Querétaro, Mexico City and Oaxaca. This festival is an initiative of the UNAM's *Coordination of Scientific Research* which encompasses 15 centres and 21 institutes, of which half have invested in budget and personnel for science communication. These investments are variously called areas, units, sections, coordination or departments for science communication. Some have an annual budget and others do not but all have full-time staff and in some cases, there are researchers associated with them. Some are devoted just to the promotion of their institution, while others perform public activities related to the field of science of their institution and a few also do research in science communication. In some cases, these departments serve as a bridge between the scientific community, the media, the public and decision-makers. These many different initiatives have helped produce more participative researchers and a new kind of science communicator.

Based on the experience in UNAM we can consider there have been three generations of science communicators, according to their professional training. During the pioneer years (late 1960s and 1970s) the only way to become a science communicator was through practical experience, because formal courses in the field did not exist. Most of those active in the field came from a scientific background, with some from the field of communication. Those whose initial

background was science had to acquire experience and skills in some communication media, and those who started out in the field of communication had to learn to collaborate with scientists. Gradually, a second generation of science communicators began to emerge; they had an initial professional training in one of the fields mentioned above, but decided to take a step further and enrolled in formal postgraduate studies or specialized courses in a complementary field.

The need to plan and design specialized courses to train science communicators soon became evident. Both generations combined their expertise to develop and teach these courses. In 1995, UNAM launched the Diplomado en Divulgación de la Ciencia (Science Communication Diploma), a 240-hour course with the purpose of providing theoretical and practical tools to enable graduates to communicate science with the general public [Sánchez-Mora et al., 2015]. Over 400 students have graduated from this course. The DGDC also offers similar courses in other states of Mexico which are designed to fit the needs of the institution. Continuous evaluation has been a fundamental instrument for the planning and updating of these courses. Since 2003, the Postgraduate Programme in Philosophy of Science at UNAM offers a Masters and a doctorate degree with several tracks, one of these in science communication, strongly focused on theory and research skills. This programme is shared and supported by several university departments: the School of Philosophy and Literature, the School of Science, the Institute for Philosophical Research and the DGDC at the UNAM. [Sánchez-Mora et al., 2015].

### **New education programme planned**

Based on the experience of the Diplomado en Divulgación de la Ciencia and the Philosophy of Science Postgraduate Programme, as well as present-day needs for professional development in the field in all its complexity, the DGDC is currently working on a project for a postgraduate specialization in science communication that will offer students a solid theoretical and methodological background as well as the opportunity for extensive practice in some area of personal interest.

In spite of the increasing number of full-time science communicators, there are also examples of scientists who perform science communication activities with considerable success. Such is the case of Noboru Takeuchi, a scientist from the Centre for Nanoscience and Nanotechnology from the UNAM (campus Ensenada). In 2007 Takeuchi created a programme, Ciencia Pumita (Little Puma Science) which publishes books for children. More than 20 books have been published, of which 15 have been translated into ten different indigenous languages of Mexico. In Mexico, 10 per cent of the population speaks another language besides or instead of Spanish. In 2015 Takeuchi received the RedPop Prize for Science Communication.

Examples such as Takeuchi's show one of the advantages of having science communication activities based in a university; it makes it easier to involve scientists as well as experts with different technical and artistic backgrounds. Universities can also provide infrastructure and financial support. However, university-based science communication may risk becoming "too academic". Degrees are becoming increasingly important in order to get hired. Those who may have a lot of experience but no degree are at a disadvantage. Evaluation is an important issue because it provides the criteria for hiring and promotion. However, quite often the established and official criteria used do not apply to science communicators. The criteria also include the qualifications for the evaluators,

usually scientists, who do not understand and value the work of science communicators. A group within the DGDC has been working on a proposal which includes peer evaluation, criteria and parameters for an adequate and just evaluation for a wide spectrum of profiles of science communication professionals [Sánchez-Mora et al., 2015].

After several decades of UNAM's extensive commitment to science communication it is interesting to reflect on the ideas of Luis Estrada, founder of this programme. For Estrada, culture and education were inseparable and the roots of scientific culture are provided by the formal educational system. Therefore, he initiated activities in public communication of science with the purpose of reinforcing and complementing the scientific education of the population. He expected the active participation of scientists as fulfillment of their social responsibility [Estrada, 2014]. In 1988, the staff of the Science Communication Coordination Centre (CUCC) at UNAM presented a document, *La Comunicación de la Ciencia como una Labor Académica* (Science communication as an academic activity), to UNAM's Scientific Council, underlining the importance of science communication activities within UNAM [Estrada, 2014].

Thirty years later, there have been considerable results in this field, but science communication is still considered a third-rate professional activity for academic staff, after research and teaching. Only in recent years has it been formally recognized in the Law of Science and Technology, and the National Council for Science and Technology (CONACYT), UNAM and other Mexican universities have established the need for, and importance of, science communication.

We identify some outcomes and challenges from the developments outlined above:

- a) Public communication of science and technology at UNAM has developed in multiple ways with a great heterogeneity of goals, public, and achievements;
- b) There is no single university programme that establishes minimum criteria or guidelines for the development in the field; each department or institute has its own agenda;
- c) Policies in favor of the communication of science within UNAM are scarce;
- d) The profession is still unstable because the programmes and activities depend on those in the top positions;
- e) The three substantial functions of UNAM: teaching, research and the dissemination of culture, provide an excellent frame for facing these challenges.

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