

Developing a New Approach to Understanding the Ecosystem of Scientific Dissemination in Mexico: Geography, Activities and Characteristics

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1. Introduction

According to Tomasello (2008), human communication is the unique characteristic that has enabled us to share, accumulate, and store vast quantities of information, leading to the creation and progress of societies. Thus, it is natural to recognize that scientific communication and dissemination have been part of science's essence since humankind invented it, fulfilling goals in modern societies such as sharing the excitement of science, influencing people's opinions to make informed decisions, debunking misinformation, and improving well-being (Bankstone, 2018).

In Mexico, science dissemination can be traced back to the 1950s and 1980s when an increase in science communication journals and museums began to proliferate and flourish. Lately, in the 2000s, the institutionalization of science through the consolidation of the National Council of Science and Technology (CONACYT) facilitated the implementation of new programs and activities such as workshops, scientific programs for the media, summer schools, science fairs, and interactive science museums (Sánchez-Mora et al, 2015).

Nowadays, science dissemination in Mexico is in a state of consolidation and growth (Sánchez-Mora et al, 2015), where research in this field is decisive to find areas to improve. Although several quality research proposals have been performed, these have been mainly focused on case studies (Nepote & Reynoso-Haynes, 2017). Thus, little is known about the ecosystem of scientific dissemination in Mexico, leaving research gaps that would help improve the outreach and impact of scientific dissemination in Mexican society (Sánchez-Vazquez, 2008).

My research proposal will be focused on the understanding of the ecosystem of scientific dissemination in Mexico through the analysis of public databases containing information in three research lines: (1) the geographical distribution of science centers, (2) the activities of science dissemination centers, (3) the key characteristics of the science dissemination programs funded by CONACYT.

2. Research Question

1. What is the current ecosystem of science dissemination in Mexico?

3. Research Design

Aim 1: *To characterize the level of science outreach activity in science centers across Mexico.*

- a. Using public databases of science dissemination centers, I plan to create heat maps that show the geographical distribution of these centers across Mexico. In order to interpret and have a deeper analysis, the maps will consider different contexts such as population, area, and marginalization index per state. This aim will help determine possible underserved regions to strategically plan the opening of new museums.

Using preliminary data of the distribution of science and technology museums publicly provided by the Cultural Information System of Mexico, I created the map shown in figure 1, where a darker tone of green means a greater number of museums. It is observed an unequal distribution of science dissemination centers that should be further examined.



Figure 1. Unequal distribution of science dissemination centers in Mexico.

- b. Using the information reported on the science centers' websites and by the Cultural Information System of Mexico, I will create a network map of the offered activities. This map will provide valuable information to innovate the activities proposed in the centers, avoiding repetitive dynamics that could be tiring for the audience.

In the map, two different kinds of nodes will interact: 1) the nodes representing the science centers (NSC) and 2) the nodes representing the activities (NA). Thus, the number of connections a node NA possesses will indicate the number of centers that conduct that activity.

Using preliminary data of the activities offered by the museums used in a), I created the network map presented in figure 2 that shows the NA nodes in green and the NSC nodes

in gray. This map makes visible a little offer of activities and the overuse of activities such as graphic exhibits and historical exhibits.

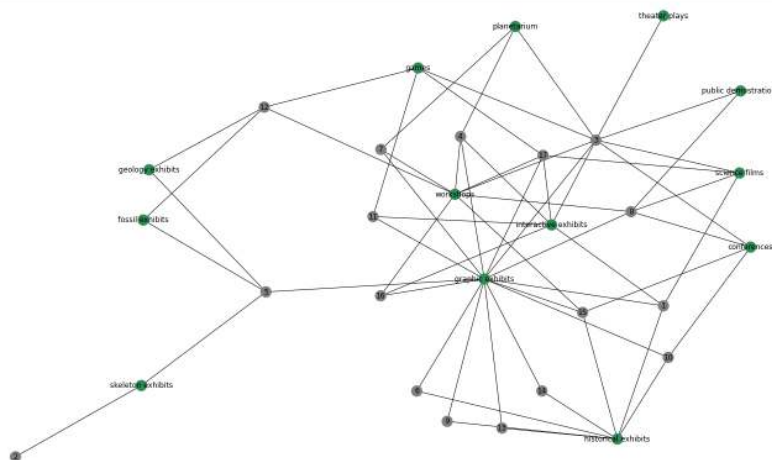


Figure 2. Network map of the science and technology museums in Mexico and the activities offered by them.

Aim 2: To understand the key characteristics of the science dissemination projects funded by the National Council of Science and Technology (CONACYT) in Mexico.

- a. CONACYT is the major founder of science dissemination programs in Mexico. Thus, an examination of the key characteristics in the projects funded by CONACYT is necessary to assess the impact and outreach of the programs. Among the proposed characteristics to analyze are the target audience, the performed activities, and the budget spent.

In this aim bar plots will be created using data from the project records on the CONACYT website.

Using preliminary data of the target audience and the activities performed, ten out of the nineteen scientific dissemination projects funded by CONACYT in 2021 were analyzed, obtaining the bar plot shown in figure 3.

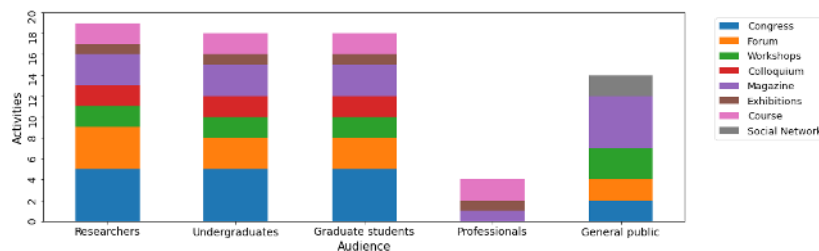


Figure 3. Audience and activities of ten out of the nineteen projects funded by CONACYT in 2021.

Aim 3: *To build an active database and network of science dissemination projects across Mexico.*

- a. Using the databases and websites explored in aims 1 and 2, I will create a database with the activities offered, the schedule, the target audience, and a description. In the future this database will be active; thus, practitioners will be able to upload information about their activities and gain diffusion or connect with other practitioners.

Hopefully, this database will help increase the outreach of science dissemination activities by increasing the number of participants in the activities.

For the creation of figures 1, 2, and 3, the Python programming language was used. The code can be found in the following link: https://github.com/greci-gareli/Maps_Bar_Aim1.git

Intellectual Merit

In Mexico the traditional approach in science dissemination research has been individualistic, focusing mainly on the analysis of case studies. Thus, the gaps regarding the outreach and impact of scientific dissemination in Mexico that could be discovered studying the ecosystem of scientific dissemination have not been properly analyzed. This proposal will create a change on this by examining science dissemination in Mexico from a broader perspective through the examination of data obtained from public databases and websites.

Broader Impacts

Through the understanding of the ecosystem of scientific dissemination, this proposal will help increase the impact and outreach of science dissemination in Mexico. First, the government and decision-makers could create more inclusive and innovative initiatives by considering underserved regions (Aim 1), the key characteristics of the existing programs (Aim 2 and 3). Second, practitioners could find it easier to collaborate (Aim 3) and design novel activities by knowing the ones that are overused. Third, a space to share scientific dissemination activities will help in the communication of such activities, increasing their outreach and impact (Aim 3).

Thus, the chosen aims have enough reported information to obtain valuable data to allow the government, practitioners, and decision-makers to create more innovative, diverse, and inclusive projects.

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