

## **Different approaches to Public Communication of Science**

**Elaine Reynoso-Haynes<sup>1</sup>**

Universidad Nacional Autónoma de México (UNAM), Mexico

### *Introduction*

A study of the field of Public Communication of Science (PCS) in Mexico over the last five decades shows how it has changed from being an act of “social volunteering” into a full-time profession (Sánchez, et. al., 2014). PCS has become more complex and diverse. The diversity of media that are used, the range of publics served, the array of motives and strategies employed and the different professional backgrounds and expertise as well as styles of those who are active in the field are indicative of how the field has evolved. There are also other professional activities related to the field such as academic research, applied research for developing products to communicate science, visitor studies and evaluation. Other related tasks are public relations, marketing, management and entailment to connect different sectors of society such as academia, mass media, companies and decision makers. Last but not least are the activities related to training professionals in PCS.

Different terms have emerged throughout the years to refer to this activity. Each one is a reflection of different epistemological views about science and different approaches concerning why, how and what to communicate to the public as well as the relationship with the addresses.

This diversity and complexity must be addressed in PCS courses in order to provide students with a broad view, as well as the criteria and necessary theoretical and methodological tools they require as future professionals in the field.

As coordinator of a 240 post-graduate course in PCS I have observed how these different points of views and styles of teachers and the literature may be confusing to students who sometimes find them contradictory. They often ask which is the “correct one” or which one should they use? The answer is: There are no “correct formulas”, it depends on the project.

In order to clarify this panorama and as a didactical tool I have developed a proposal of different views of PCS. These approaches are artistic-cultural, educational, propagandistic, social-political and commercial. Each one reflects different theoretical backgrounds, missions, objectives, strategies, ways of relating to the public, the conformation of work teams and what is to be evaluated. The boundaries between these approaches are not fixed and two or more can be used in the same project. This tool has resulted quite useful to the students.

### *Method*

---

<sup>1</sup> elareyno@dgdc.unam.mx

The *Diplomado en Divulgación de la Ciencia* is a 240 hour graduate course in science communication which has been offered in the UNAM each year since 1995. It provides students with the theoretical basis and skills they require to become professional science communicators. Students have different backgrounds and interests. In 21 years approximately 400 students have graduated from this course, some became full time science communicators and others communicate science as an additional activity to research and/or teaching.

In order to clarify the student's confusion about the different approaches and styles they observed from teachers and literature, we (members of the academic committee of the course) decided that it was necessary to classify these approaches so that we could present them explicitly to the students. We established five broad categories or approaches: artistic, educational, commercial, propagandistic and social-political. The borders between the different approaches are fuzzy and two or more may be used in the process of communicating science.

The different discourses of the teachers, the thesis in science communication and the literature were analyzed. The elements considered for this analysis were: the epistemological stance concerning science and the different points of view about science communication.

Every science communicator has a point of view about how scientific knowledge is constructed. When they develop a product or an activity such ideas may be intentionally or unintentionally transmitted. It is quite frequent that the science communicator has a certain point of view about science but portrays a different one through his or her work. For instance, he or she may see science as a social enterprise which depends on the economic and cultural context but present an image of scientific knowledge as solid, objective, finished and therefore irrefutable. Some science communicators choose to transmit such an image because they feel that they need to present science as flawless in order to promote respect and confidence in such knowledge.

The image science communicators have and wish to convey about science will influence their perspectives about why, how and what to communicate to the public. This perspective determines several aspects of a process such as: the theoretical framework used for developing a project, the mission, the objectives, the contents, the way the contents are presented, the expected relationship with the public, the conformation of the working team, the relationships and leadership within the team, the methodology used to develop the project and what is to be evaluated.

Therefore there are no definite or correct formulas for developing a project in science communication. Besides the above mentioned aspects, the context will also be decisive. The context depends on external and internal factors. The external factors have to do with mission of the institution developing the project. Sometimes one institution orders and finances the project and another one (perhaps more than one) is the developer. In such cases it is necessary to reach an agreement in terms of missions and objectives. Other important factors are the financial, human and technical resources; the media used; the time in which the project must be finished, the target audience and the social and cultural context. There are also internal factors related to the institution developing the project such as experience, who is in charge, the working team, the rules of interaction among the

different participants of this group and last but not least the approach for communicating science.

My motto is: Science communication is an intellectual, creative and ethical challenge. Everything goes as long as it is done with responsibility and quality". Responsibility has to do with conveying "correct messages" which means that the scientific content is correct and that it has the potential to be interpreted correctly considering the knowledge, interests and needs of the public. Quality has to do with how the media is used.

### *Results*

A brief description of the approaches follows.

#### The artistic and cultural approach

The purpose of communicating science with this approach is to bridge the gap between the "two cultures" proposed by C.P. Snow: the sciences and the humanities. Sciences are seen as objective and cold while the humanities and arts are seen as subjective and "human". Ana María Sánchez (2009) considers that the basic ideas of this approach are: a) science is important, b) science is part of culture and c) the acquisition of culture may be a pleasant experience.

This approach was the one used in the early years of science communication in Mexico, in which learning how to communicate science followed an artisan process of learning from the more experienced. Those pioneer practitioners analyzed the characteristics of successful "cultural products" such as classic literature. The characteristics of a good book are: a) it is well written, b) the topic is of general interest, c) the author has culture, d) it is original and e) it appeals to the emotional side and aesthetic pleasure of the reader.

These characteristics are applicable to a good science communication book. However there are certain limitations to creativity that must be considered and that is the science content must be "correct". Having the correct science does not guarantee that the reader will interpret what is expected. Therefore, the possible problems in interpretation must be anticipated.

Another example of the artistic approach is a theatrical play with scientific content. A good scientific play must take into account both aspects: it must be a good play and the content must be correct. A limit to creativity in this case has to do with the theatrical resources used. The audience must be able to distinguish between such resources and reality.

#### The educational approach

This approach was the second one to appear and it is related with the notion of learning in informal environments. Carmen Sánchez-Mora (2009) considers that the reception of the message by the addressee (public, reader, visitor to a museum, etc.) has the same characteristics as informal learning: it is personal, context dependent, free, has no definite objectives and it may occur in many different environments.

The meaning of learning in an informal environment is still the object of much discussion and therefore the purpose of using them is also debatable. For some these objectives are very close to school learning. In such cases these products and spaces are used as a

complement to the formal school curriculum. However for others learning in such contexts has more to do with motivation, appreciation, having fun, stimulating imagination and creativity and providing unique experiences. Therefore, another open debate has to do with what and how to measure what is learned in informal environments and situations.

What is common to these points of view is the use of theoretical frameworks from the educational field. I think that it is a mistake to try to reproduce practices which are common to formal education not only because the contexts are completely different but also because such products and spaces used to communicate science are not used to their fullest as environments for informal learning.

This issue requires much more discussion. I consider that the spaces and products used for PCS should be seen as ingredients of the Educational Society proposed by Jacques Delors and his colleagues (1996), as tools for life-long learning which must be flexible in time and in space (Reynoso, 2012).

#### The commercial approach

Products and spaces for PCS are sources of income and the addressee is considered a client. There are two groups of potential clients: the possible sponsors and the buyers (reader, visitor, t.v. viewer, etc.).

This approach is particularly applicable to the case of big and expensive projects such as science museums in which a certain degree of marketing is essential. The aim is to obtain financial support and to increase economic gains. Therefore different commercial strategies are used such as fund raising campaigns and techniques to attract sponsors; programs to attract certain sectors of the population and membership programs.

Sometimes sponsors demand certain conditions, such as advertising a product or conveying certain messages, which are unacceptable to the science communicator and the image of science they want to convey. A balance must be reached between such requests and the communicators convictions.

#### The propagandistic approach

The aim of those who have this approach is to promote a positive image of science, to increase social interest and acceptance of scientific research and to attract more financial support for science.

In some cases the science communicator serves as a middle person between the academic community, the mass media, the public, the financing agencies and the decision makers. Many research institutions have science communication departments in charge of tasks such as these.

#### The social-political approach

The basic ideas of this approach are: a) Science is not neutral. The development of science and technology is a social process and depends on a political agenda; b) The linear model of science-technology is the basis for economic and social progress, is unacceptable or at least has serious limitations, c) The development of science and

technology have important impacts on society and the environment, d) Scientists have a commitment with society.

Those who adopt this approach see PCS as a political tool and the act of communicating science as a political activity. It is used to discuss issues such as genetically modified products, nuclear energy, water usage and climate change.

The media used are panel discussions, debates, mixed working groups, etc. Strategies are designed to promote the participation of citizens in issues related to science and its applications. The aim is to promote scientific culture so that citizens have the necessary elements to make informed decisions and to participate in actions.

Examples of how to apply these approaches

As was mentioned before, there are no set formulas for projects in PCS. Each project depends on the context in which it is developed as well as the PCS approach. Two or more of these approaches may be applied in one project.

Example 1: PCS as a tool for implementing public policies.

The success of public policies depends of the degree of public acceptance. This applies to issues such as public health, environment and risk prevention. The public requires a certain level of understanding of the problems in order to make the right decisions and to participate in the proposed actions. The message is: Solutions require the participation of everyone, not just the government authorities. A clear example of this is climate change. To deal with the problems related to climate change actions at many different levels are in order: international, national, regional, local and personal. In this case the two main approaches are educational and social-political.

Example 2: The model of Ecological Information System

This model proposed by Alicia Castillo (2000) is based on the idea that PCS is a tool for inducing changes in the way society interacts with the environment, their habits and daily actions. To do so people require knowledge and skills so that they can make decisions and participate in activities and demand certain actions from the authorities. This applies particularly to ecology related issues in which PCS is used as a means to create awareness about environmental problems. However, awareness is not enough to solve the problems. Certain strategies are required to promote action.

This model is used to solve environmental problems with a sustainable approach. It is composed by three groups:

- a) The community of ecologists as producers of scientific knowledge.
- b) Agents of change (specialists who work with rural communities with the purpose of promoting sustainable actions in the use of natural resources)
- c) The rural sector such as local farmers and forest guards, who live directly of the natural resources by exploiting or protecting them.

This model rejects the traditional (deficit model) to communicate science between the scientists and the users of the natural resources in which the first ones communicate knowledge to the second ones without taking into account their experience and needs. This is where the agents for change come in. They must be able to talk with the experts

and understand the scientific knowledge they produce and communicate it to the rural sector taking into account their specific needs and experience. Then they go back to the scientists and share with them what they have learned from the rural sector in terms of knowledge, experience, culture and necessities. With this process of communication the three sectors work together to produce new knowledge which can be applied to the local context. The success of this model is to not consider scientific knowledge superior to the common sense knowledge of the rural sector and to value their experience and knowledge. .

The agent has to be a science communicator. The main approach in this case is the social-political.

### Example 3: The glocal model

This model is the result of trying to find the balance between global scientific knowledge and local issues and solutions. Global knowledge is applied locally and local decisions must consider the global context (Reynoso, 2003). A perfect example of an issue which must be dealt with a glocal approach is climate change. While exploring the local context it is advisable to be as local as possible in order to achieve the desired impact, this includes cultural, historical and social ingredients.

The key to developing a project based on the glocal model is inclusion. It is essential to include persons that represent the local context such as local scientists who should know the local problems and solutions, teachers, persons from different sectors of society and artists. Local art, stories, legends and music may serve as a creative bridge to close the gap between science and the local community. It is also important to communicate what is being done locally to solve problems and to present local success stories as well the presenting the institutions involved in the solutions. The purpose is to promote a feeling of belonging and to foster the attitudes and values that are needed for people to live in harmony with their natural and social environment with a promising future for all (Reynoso, et. al, 2005).

In the glocal model all approaches are used.

### Conclusions

This classification has helped the students to understand that there are no “definite or better formulas” for developing a project in science communication. The context in which the project is developed; the mission of the institutions developing the project, the objectives, the target audience and the media used are also determining factors. The approaches used depend on the above factors as well as the image of science we wish to convey and the perspective about science communication. These ingredients will also determine the composition of the work team that will develop the project, the methodology that will be used and what will be evaluated. Therefore all approaches are sound and valid and all of them are useful.

## Bibliography:

Castillo, Alicia (2000). "Communication and Utilization of Science in Developing Countries", *Science Communication*. 22(1), 46-72.

Delors, Jacques (1996). *La educación encierra un tesoro* (Informe del UNESCO de la Comisión Internacional sobre la Educación para el siglo XXI). Ediciones UNESCO, México.

Reynoso-Haynes, Elaine (2012). *La cultura científica en los museos en el marco de la educación informal*. (Tesis para obtener el grado de doctora en pedagogía). Facultad de Filosofía y Letras, Universidad Nacional Autónoma de México, México.

Reynoso, H. E., C. Sánchez Mora y J. Tagüeña (2005). "Lo glocal: nueva perspectiva para desarrollar museos de ciencia". *Elementos* 59, 33 – 41.

Reynoso, H. Elaine (2003). "El papel del divulgador en la formación de una cultura científica nacional". (Paper presented in the panel "Cultura científica y cambio social"). *Memorias de la VIII Reunión de la Red Pop y XII Congreso Nacional de Divulgación de la Ciencia*. Centro de Ciencias EXPLORA, León, Gto. México, 26 al 29 de mayo de 2003.

Sánchez-Mora, C.; E. Reynoso-Haynes; A.M. Sánchez Mora and J. Tagüeña (2014). "Public Communication of Science in Mexico: Past, Present and Future of a Profession". *Public Understanding of Science*. (June 12, 2014). <http://pus.sagepub.com/content/early/2014/04/28/0963662514527201>

Sánchez-Mora, Ana María (2009). "La mirada cultural", Apuntes del módulo *Miradas de la Divulgación* del XIV Diplomado de Divulgación de la Ciencia, DGDC; UNAM.

Sánchez-Mora, Carmen (2009). "La mirada educativa". Apuntes del módulo *Miradas de la Divulgación* del XIV Diplomado de Divulgación de la Ciencia, DGDC; UNAM.

Sánchez-Mora, Ana María (2000), *La divulgación de la ciencia como literatura*. Dirección General de Divulgación de la Ciencia. UNAM, México, D. F.

## Acknowledgements

I would like to thank my colleagues Carmen Sánchez-Mora and Ana María Sanchez for their valuable discussions in this work.