Impact assessment of activities for the popularization of science, technology and society

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Abstract

This presentation synthesizes the main theoretical and methodological aspects, as well as the advances and conclusions, of the Proyecto Red de Medición del Impacto de la Popularización[1] de la Ciencia y Tecnología en Iberoamérica (REMIPCYT [Impact of Popularization of Science and Technology in Ibero-America Measurement Network] Project), financed by the Programa Iberoamericano CYTED (Ibero-American Programme for Science, Technology and Development). It was carried out within the framework of the Red-POP (Red de Popularización de la Ciencia y Tecnología en América Latina y el Caribe [Network for the Popularization of Science and Technology in Latin America and the Caribbean]). The impact is interpreted in terms of the effects produced in social subjects and in society as a consequence of the processes of scientific and technological knowledge appropriation. Such effects translate into and can be perceived through attitudes, practices and social behaviours. The results show changes in four selected dimensions: (1) degree of involvement in the popularization activity, (2) relationship between the thematic content on popularization and the personal decision-making of the participants, (3) relationship between popularization and

[1] Popularization entails processes of social, cultural and public policy production and intervention which promote collective participation and critical thinking concerning the relationships between science, technology and everyday life, bringing about new ways of connecting with knowledge, reality and civic responsibility. (REMIPCYT 2007 Report)

the dialogue of knowledge, (4) impact of popularization on personal development and working life.

Introduction

Impact assessment: its importance

This contribution synthesizes the main theoretical and methodological aspects, as well as the advances and conclusions, of the Proyecto Red de Medición del Impacto de la Popularización de la Ciencia y Tecnología en Iberoamérica (REMIPCYT [Impact of Popularization of Science and Technology in Ibero-America Measurement Network] Project), financed by the Programa Iberoamericano CYTED (Ibero-American Programme for Science, Technology and Development). It was carried out within the framework of the Red-POP[2] (Red de Popularización de la Ciencia y Tecnología en América Latina y el Caribe [Network for the Popularization of Science and Technology in Latin America and the Caribbean].

Twenty years of cooperative efforts by eighteen Latin American countries, with the militant commitment of setting objectives and goals to generate spaces of democratization of the scientific and technological knowledge, have turned the Red-POP into a model of strategic intervention for inclusion, equity and the improvement of personal and collective resources which would enable the appropriation of knowledge as a transformational force of personal realities.

Impact assessment is a pending task for those of us who are members of the programmes of the Red-POP. It is time to take a look within, to reflect and examine ourselves on what we do and the effect it may have on the way people act in life. The impact assessment of the popularization of science and technology (S&T) entails the interpretation of the effects produced in social subjects and in society as a consequence of the processes of S&T knowledge appropriation, effects that translate into and can be perceived through attitudes, practices and social behaviours. “The basic difficulty that arises in an analysis of this nature is the feasibility of identifying and weighing the intervention of S&T in society,

[2] Red-POP: Created in November 1990 at the request of UNESCO’s Programme on Science, Technology and Society. It integrates programmes in Latin America and the Caribbean with the objective of strengthening the democratization processes of S&T knowledge. It is supported by communication mechanisms, as well as cooperation and solidarity exchange. See “Ciencia, tecnología y vida cotidiana, reflexiones y propuestas del Nodo Sur de la Red Pop” – Edit. UNESCO. Uruguay, 2007

culture and economy and, particularly, the quality of life of the population in the face of the existence of many other factors operating in the production of social change."[3]

The challenge consisted of developing a set of indicators that – apart from measuring the results or assessing the effectiveness only in quantitative terms – made it possible to distinguish the social and cultural effects of the popularization activities, the changes in and levels of involvement at an individual and collective level, and the possibility of understanding, attributing meaning and linking S&T knowledge with citizen participation and with decisions affecting the quality of life.

As a starting point, it was necessary to 'call into question our own certainties', hypotheses and definitions concerning the role of popularization and popularizers, bearing in mind the diversity of social, political and cultural contexts in which the popularization programmes that are part of the Red-POP are inserted. As a secondary effect, this impact assessment entailed an inward change and made it possible to reflect upon the meaning and the rationale of each of the programmes.

Development

The Proyecto REMIPCYT was presented in the Call for Proposals 2007 issued by the Programa Iberoamericano CYTED, in the Science and Society thematic field, and was approved in December of the same year. From then on, a path of cooperative work was taken, establishing a network of programmes undertaken by members of the Red-POP.

The research was conducted during a four-year period (2008–2011) involving six centres/programmes that are members of the Red-POP:

- Mundo Nuevo, Programa de Divulgación y Enseñanza de las Ciencias; Argentina. Coordinating programme of the REMIPCYT Thematic Network
- Asociación Civil Ciencia Viva; Uruguay
- Fundación CIENTEC; Costa Rica
- Museu da Vida, FIOCRUZ; Brazil
- UNAM/D.G.D.C. (Dirección General de Divulgación de la Ciencia); Mexico
- ASPRODIC; Nicaragua.

[3] Estebanez, M E Impacto Social de Ciencia y Tecnología: estrategia para su análisis, diciembre de 1997. Edit. REDES

We cannot speak of Latin America – as all of the programmes are carried out in Latin American countries – as a homogeneous whole, because there are different identities, languages, traditions, as well as educational, political and economic models, which have an impact on the processes of popularization and the role that it has in society. "The multicultural character of Latin America requires the development of specific, contextualized strategies devoid of unilateral or hegemonic formats and recipes. Taking into consideration this diversity, this impact assessment does not seek global or universal quantitative results; on the contrary, it aims at establishing categories of analysis that contemplate both similarities and differences."[4]

Throughout four years of sustained work—with seminars, eight experience exchanges, dialogues and collective productions—, we made progress in:

- hypothesis formulation
- identification of dimensions and possible variables to define indicators
- selection of instruments
- pilot application
- adjustments
- data interpretation
- drawing of conclusions
- strategies for transference and communication

For further information on the advances in each of these items, visit the REMIPCYT website.[5]

Advances in the research process

The hypothesis formulated granted popularization the possibility of transformation as far as the opportunities in people's lives are concerned. The hypothesis was worded in the following way: "Science popularization is capable of bringing about changes in people's everyday lives, as it has an impact on the processes of construction of knowledge, attitudinal changes and decision making, regarding both the individual and the community."

The first exchanges and debates made it possible to advance in the tasks of conceptualizing, surveying and selecting the activities, but they also gave rise to a series of complexities, questions, doubts and new considerations that oriented the procedural decisions:

[4] Merino, Graciela. Documento REMIPCYT 2008.

1. Impact assessment is included within a weave of non-linear relationships in which social, cultural, scientific and political aspects are linked.
2. Social facts or phenomena cannot be "measured" directly. When a social fact ceases to be mere observation and becomes an object of investigation, it is necessary to define clearly and precisely the variables susceptible to quantitative and qualitative evaluation.
3. The multiplicity of activities and the institutional and political differences, as well as the differences in social and cultural contexts, made it a difficult task to find equivalent, comparable indicators. How to carry out an impact assessment in a multicultural, dynamic context with different practices?
4. Is it possible in a four-year project to handle the temporary nature of the changes in attitudes, interests, etc? Only the immediate impact is referred to, as it is impossible to consider the impact sustained over a period of time beyond the span of the research. The focus is on the tendencies recorded within the research period.
5. It is possible to find common indicators 'without ignoring specificity and valuing plurality.'
6. The pilot test for the application of the instruments (i.e., questionnaire, observation, interview) was administered simultaneously in each of the programmes participating in the research. The data obtained in this pilot test provided an initial set of quantitative information that was insufficient both to differentiate aspects related to behaviours, attitudes and interests and to account for the way in which people respond and act when faced with popularization proposals. The need to adapt and adjust the implementation of the instruments was reinforced in order to achieve a deeper qualitative analysis.
7. Four dimensions broad enough to cover the impact were selected:

- Impact on the processes of knowledge appropriation and transference.
- Participation in interactive contexts.
- Attribution of meaning to S&T knowledge concerning the construction and exercise of citizenship.
- Appropriation and transference of knowledge regarding work and productive activities.

Methodology

On the basis of the previous decisions and the prior considerations mentioned above, and also taking into consideration the expertise in popularization of the members of the Red-POP,

[5] www.remipcyt.org

the group decided to apply a flexible methodology, which would adapt to the feedback obtained from the fieldwork:

- Institutional and activity **cards**, in order to record the context of application of the research, taking into consideration the cultural and social diversity.
- Semi-structured **questionnaire** with some open-ended questions, so as to gather objective, systematized information that could be evaluated with different techniques.
- Direct, semi-structured **observation** of the participants in the activities, carried out by a member of the programme with expertise in the activity being developed. This tool makes it possible to collect information on attitudes, impressions, forms of relationship, level of interest and empowering.
- Short, unstructured **interview**, which would make it possible to gain precision in the observation and to verify some questionnaire answers.

The techniques chosen were those that could provide information to be analyzed from a quantitative and qualitative point of view, in the belief that research is a combination of both.

Results

The integration of quantitative and qualitative data threw into relief social, cultural and regional differences of invaluable relevance for this research. One of the effects involves new contributions to modify and optimize the popularization strategies in each of the programmes involved in the research.

The objective of a complementary interpretation consists in managing to obtain different images of each piece of data, contrary to a search for corroboration or coincidences between the quantitative and qualitative information. Cross-interpretations, new distinctions and relations among the items of data were carried out, which broadened the spectrum of interpretation and conveyed how the impact manifested in the different groups.

Presentation of quantitative information

This type of information is synthesized in the following figures (1 to 10), whose interpretation makes it possible to compare and contrast data, variables and categories

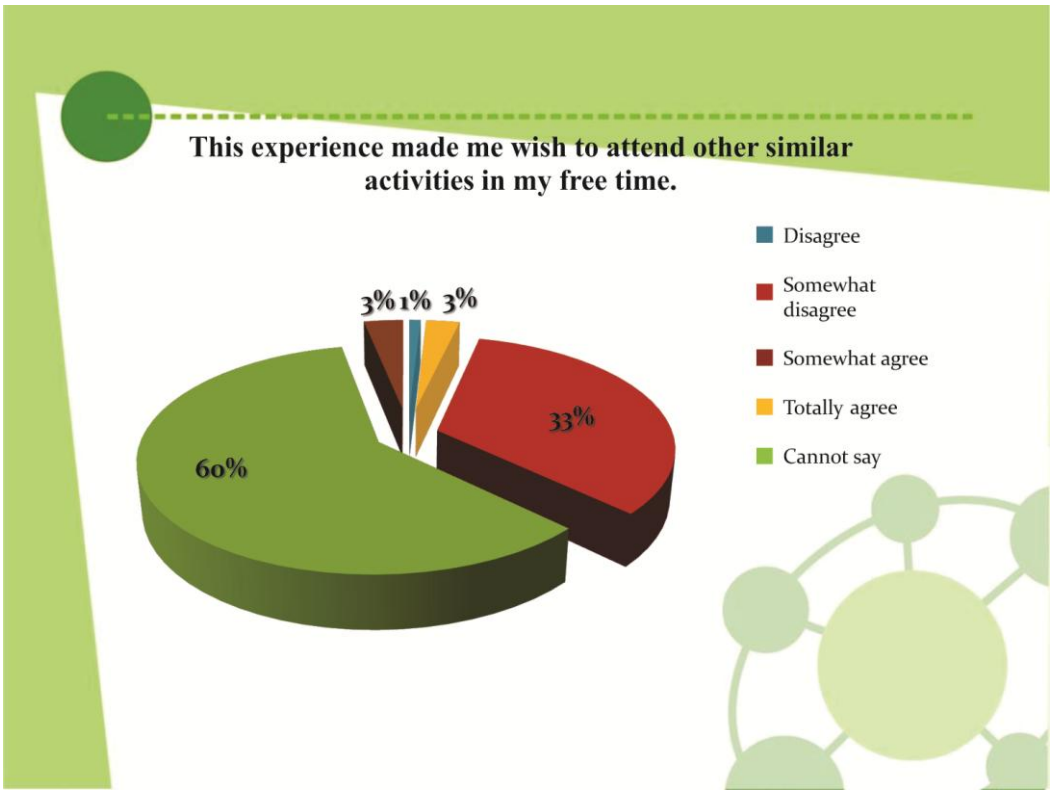

Figure 1: Data on age of survey respondents

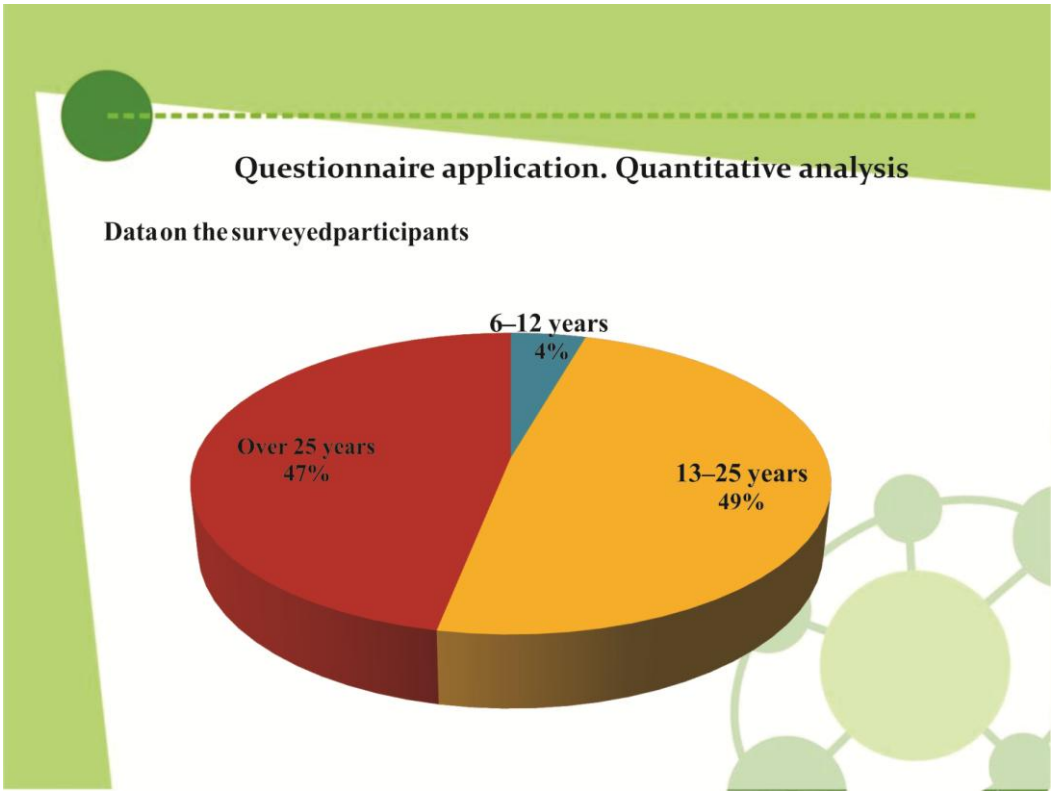

Figure 2: Data on level of education

Presentation of qualitative information

This analysis, based on the interpretation of interviews and observation records, enriched and added experiential content to the quantitative data. Therefore, the numbers and data became a description of interests, attitudes, social practices, family dialogues, modalities of interaction.

The impact translated into:

- Amazement, surprise, novelty, enjoyment (i.e., the recreational dimension)
- Interest
- Curiosity
- Reflexion, critical/reflective outlook (i.e., seeing the same from another perspective)
- Understanding
- Attitudes (e.g., 'it is necessary to preserve nature', 'preserving nature and humanity')
- Procedures, abilities (e.g., 'I've learnt to learn.' An appreciation of learning on the basis of experience appears, which differs from the more conventional type of learning associated with reading and learning from books).

Trends in the qualitative analysis

- In many cases, the descriptions in the records suggest a process of change in the attitude, behaviour and expressions of the visitors.
- The most valuable aspect of the observations seems to be related to the interaction, the level of acceptance of the activities and the interest generated by them. In all cases, the information recorded gives evidence of attitudes that would be difficult to register by means of other instruments, as these question the subject.

- The attitudes related to a group, regarding motivation, mutual encouragement towards the experiences, reciprocity, cooperation and innovation in the use of the material or appropriation of the activities, seem relatively easy to observe, which would make it possible to complement the information collected by means of other instruments.
- It is noteworthy that the activities were greatly enhanced by:

- The encouragement from a member of the group to a passive member.
- The exchange of roles on the basis of the different answers or interests generated by the activities.
- Cooperation, as each member of the group contributes the background information they possess.
- Complementarity, mainly between adults and children, as the former read the posters or look for unconventional uses and the latter encourage the recreational participation and exploration.

- It can be confirmed that in almost every single observation there was an impact on the family environment, as mainly the interactions between parents and children were multiplied.
- The more visible data regarding the empowerment seem to be evident in the capacity to explain by their own means what was experienced or learnt, and the possibility to connect the experiences with everyday life, in short-term situations.

Conclusions

- In almost every case analyzed, there seems to exist a positive impact on the family environment. This may be the consequence of having found in the undertaking of popularization activities some aspect that fosters the relationship between parents and children (i.e., in terms of the social, relationship and learning aspects). It is noteworthy because the activities do not specifically pursue it as an objective.
- In many of the statements there also appears a conscious positive assessment regarding the relationship between scientific knowledge, recreational activities and the connection with the school education, as well as an assessment on the content and the way in which "scientific knowledge" is presented in the S&T popularization proposals.
- A strong, overt connection was found between the appropriation of S&T knowledge and issues arising in life.

- A positive impact was evaluated as it stimulated in teachers and teacher training course students a marked interest in alternatives other than the traditional ones to communicate notions of S&T.
- A high incidence in the formation and training of rural communities and groups was reported, as their work and productive life conditions were modified.
- There was a growing interest in being updated on S&T topics affecting the community or peer group.
- Activities connected to S&T knowledge were incorporated to the leisure time.
- An impact was achieved on family discussions and attitudes when exchanging feelings and knowledge.
- There was a growing prevalence in attitudes towards questioning, interrogating and doubting, downplaying the passive acceptance of what is consumed as the one true knowledge.
- A significant impact was examined on the sustainable development and management of natural resources as a consequence of development and training processes in marginalized groups and communities.