Parallel Session 27: Cultural Differences in Public Understanding of Sciences

FRAMING AS A THEORY FOR THE COMMUNICATION OF SCIENCE AND TECHNOLOGY

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Keywords: theoretical framework, media, public opinion, framing, content analysis, survey, international comparison, biotechnology,

Text

Science and technology are issues that receive increasing attention in mass media (Dahinden. 2002). However, the analysis of this media coverage is often done with little or no theoretical background at all. Framing provides a promising theoretical framework that can fill this gap.

In the past several years, the framing approach has received increasing interest in communication studies (Reese. 2001) and also other social science disciplines like sociology, psychology or in political science. Despite the relative success of the concept, there is no agreed-on definition of what framing as a process or frames as results of such processes might be. Nevertheless, the following definition by Entman (1993) can be considered as a least common denominator of the various efforts to define the term: “To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such away as to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation” (Entman. 1993: 52). This definition highlights that frames are not issues, but background patterns of interpretation that structure the perception and evaluation of a specific issue. Based on that definition, public debates can be described as framing contests between competing actors that try to frame an issue according to their own point of view (Pan. 2001).

The framing approach has a number of strengths: First, it is independent of the very issue under consideration and therefore a suitable theoretical tool for cross-issue comparisons. The frame concept has been applied to a number of very different issues in science communication, that includes science in general (Dunwoody. 1992; Peters. 1994) biotechnology (Bauer, et al. 2001; Priest. 1995) or nuclear energy (Gamson. 1989). Drawing from these studies, five general frames can be identified that are independent of the specific issue to which they are applied:

1) Progress by scientific information

2) Econcomic aspects

3) Conflicts (related to distribution of resources)

4) Ethical and legal dimensions

5) Individual impacts, personalization of a topic

As a second strength, the framing theory can be applied to all phases of mass media communication processes, including public relations, journalism and media effects on audiences.

However, there are also some weaknesses in framing research, like the lack of terminological precision and the diversity of empirical frame descriptions. Therefore, this paper gives an overview on framing theory and its various empirical frame typologies (Dahinden. 2002).

The biotechnology debate in Europe has been selected as empirical case study. The empirical discussion draws on data from a media content analysis and from population surveys (Gaskell. 2004). In both data sets frames are identified by means of inductive statistical techniques (factor and cluster analysis). The comparison of media frames and audience frames shows a number of shared, but also some different frames. Media effects are found with regard to some frames, but other audience frames are not linked to media use, but to other factors (e.g. gender, age and education). The paper discusses these findings and draws some conclusion for further theoretical and empirical research.

References

Bauer, M.W., Kohring, M., Allansdottir, A., and Gutteling, J. (2001). The dramatisation of biotechnology in elite mass media. In G. Gaskell, Bauer, Martin W, (Ed.), Biotechnology 1996-2000 - The years of the controversy. 35-52. London: Science Museum.

Dahinden, U. 2002. Biotechnology in Switzerland - Frames in a Heated Debate. Science Communication. 24(2): 184-197.

Dahinden, U. 2002. Biotechnology: From inter-science to international controversies. Public Understanding of Science. 11(2): 87-92.

Dunwoody, S. (1992). The media and public perceptions of risk: How journalists frame risk stories. In D.W. Bromley, Segerson, Kathleen (Ed.), The social response to environmental risk. Policy formulation in an age of uncertainty. 75-100. Boston.

Entman, R.M. 1993. Framing: Toward Clarification of a Fractured Paradigm. Journal of Communication. 43(4): 51-58.

Gamson, W., Modigliani, A. 1989. Media discourse and public opinion on nuclear power: a constructionist approach. American Journal of Sociology. 95: 1-37.

Gaskell, G., Bauer, Martin W,. (2004). International Research Group on Biotechnology and the Public. In: http://www.lse.ac.uk/Depts/lses/.

Pan, Z., Kosicki, Gerald M. (2001). Framing as a Strategic Action in Public Delibaration. In S. Reese, Gandy, Oscar, Grant, August (Ed.), Framing Public Life - Perspectives on Our Understanding of the Social World. 35-65. Mahwah, New Jersey, London: Lawrence Erlbaum Associates.

Peters, H.P. (1994). Wissenschaftliche Experten in der öffentlichen Kommunikation über Technik, Umwelt und Risiken. In J. Friedrichs, M.R. Lepsius, and F. Neidhart (Eds.), Kölner Zeitschrift für Soziologie und

Sozialpsychologie. Sonderheft 34: Öffentlichkeit, öffentliche Meinung, soziale Bewegungen. 162-190.

Priest, S.H. 1995. Information Equity, Public Understanding of Science and the Biotechnology Debate. Journal of Communication. 45(1): 39-54.

Reese, S., Gandy, Oscar, Grant, August. (2001). Framing Public Life - Perspectives on Our Understanding of the Social World. Mahwah, New Jersey, London: Lawrence Erlbaum Associates.

Parallel Session 27: Cultural differences in public understanding of sciences

PUBLIC PERCEPTION OF SCIENCE IN EASTERN AND CENTRAL EUROPE

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Abstract:

The presentation will outline the key findings from the first major European Commission survey (so-called Eurobarometers) on public perception of science ever conducted in the 10 new European Union's Member States (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia), plus Bulgaria, Romania and Turkey. Sample questions were fielded in November 2002 to a total of 12,247 nationals in the 13 countries.

Key words: public opinion, science and technology, Eastern and Central Europe

Information, interest, knowledge

- People in the 13 countries do not only feel they are not well informed about science, but indeed, there is a surprising lack of fundamental scientific knowledge in both parts of Europe. Europeans often consider themselves poorly informed about science and technology (so state two-thirds of them), although 45.3% declare that they are interested in this subject.

- In the Eastern and Central Europe, television plays an even more important role than it does in the current Member States in informing the public about developments in science and technology. Citizens in the 13 countries prefer the other "passive" information dissemination method — e.g. they prefer radio over newspapers when they are looking for news and information related to science and technology.

- Biology, physics, mathematics, and astronomy are accepted by most people as sciences, while about three in 10 people in Eastern and Central Europe do not consider social sciences and psychology "fairly scientific". Ironically, even astrology is rated higher on the CC-13 level than history, economics, or sociology.

Values, science, and technology

- Most people agree that science is good and useful (Fig. 1). Many even think it's omnipotent. It is also true that the more people know scientific fundamentals, the more likely they are to generally believe that science will help to improve our world.

- Combating diseases, improving daily life, and interest at work are still broadly attributed to — and expected from — scientific progress. On the other hand, there is great reservation regarding science and technology as a panacea for all problems. Still, the overall image of science (that it has more positive than negative effects) finds favour in the 13 countries.

The morality of science

- Most people throughout Europe (a bit more in the 15 Member States than in the 13 countries) believe that science is value neutral in the sense that there are no evil inventions — only the application of a certain scientific finding can be good or bad.

- Still, scientists are held responsible for the misuse of their discoveries by almost half of the respondents in the new Member States. Consequently, the overwhelming majority in both parts of Europe agrees that scientists should be regulated by ethical standards that can be enforced by the authorities.

- While people in the 15 Member States are completely divided over the question of whether or not to allow scientists to conduct experiments "on animals like dogs and monkeys" (45% agree with this proposition and 41% disapprove of the idea); the overwhelming majority in Eastern and Central Europe supports (63% vs. 22%) these experiments if they target human health problems.

Food based on GMOs

- Attitudes are similar in the two parts of Europe; people first of all want to retain the right to choose between natural produce and foodstuff based on GMOs, which in other words means that the European public expects clear indication of GMO-basis on the packaging of food in supermarkets or in the menus of restaurants.

- This is an indication of the general attitude of the public that can be best described as "cautious". Eighty percent of all teenagers and adults in the 13 countries await more information before consuming genetically modified food, and about the same proportion feel that such food should only be introduced if it is scientifically proven not to be a health hazard.

The scientific profession

- Both in the 15 Member States and the 13 countries, people have the

highest regard for those professions that have technological or scientific relevance. Medical doctors have the highest prestige rating in both regions. Scientists come in at second place, followed by engineers.

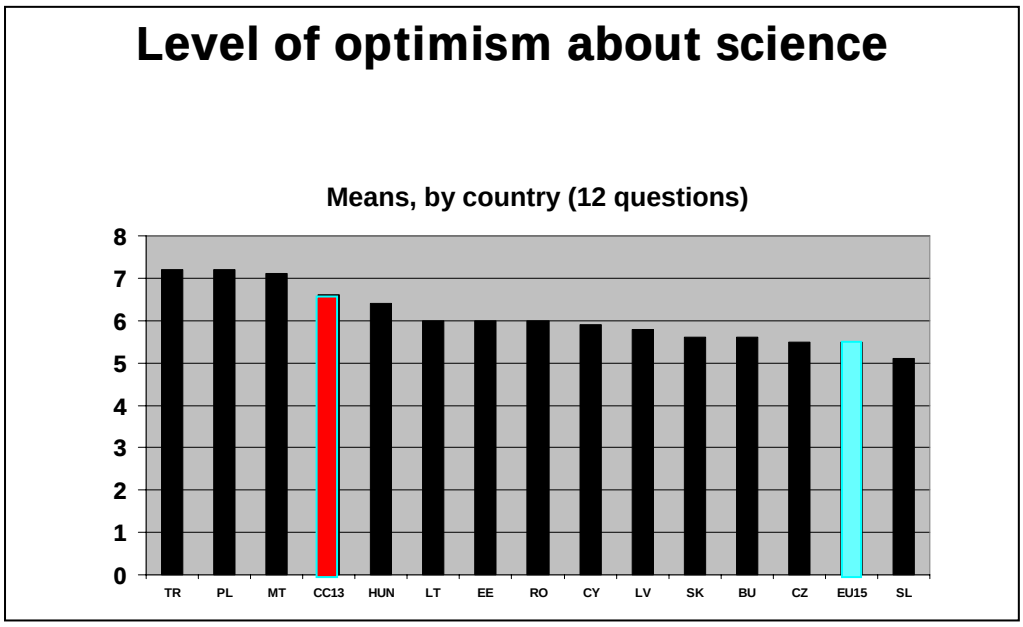
The scientific vocational situation

- People in Eastern and Central Europe are not sure if there is a scientific vocational crisis in their countries or not.
- But if there is one, certainly one of the most important reasons for a declining interest in scientific careers is attributed to the labour market in the new Member States. Most people think that mediocre career prospects and low salaries turn people away from pursuing scientific studies and careers.
- About two-thirds of Europeans support the idea of active public policies to encourage scientific careers: 60% on the EU-15 level and 67% in the 13 countries would like "the authorities to resolve this situation".

European scientific research

- Eastern and Central Europe' citizens are quite satisfied with the level of activity the European Union displays in the area of scientific research; their expectations and perception are relatively close to each other in this respect.
- Certainly, people in the 13 countries believe that research conducted at the European Union level will be more and more important (62% of the citizens in the new Member States agree) at the expense of national research.
- Clearly, people in both parts of Europe feel an important remedy for the scientific inferiority of Europe is the closer cooperation between European scientists (more in the 13 countries) and European countries (more in the EU).
- On average, six in 10 citizens in Eastern and Central Europe (59%) believe that the enlargement will bring mutual benefits for all: at the end of the process, both the current Member States and the accessing countries will possess an enhanced scientific potential.

Figure 1


Level of optimism about science
Means, by country (12 questions)
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LV
SK
BU
CZ
EU15
SL

Parallel Session 27: Cultural Differences in Public Understanding of Sciences

PUBLIC PERCEPTIONS OF SCIENCE, AS REFLECTED IN THE CONDUCT OF LEGAL INSTITUTIONS

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Abstract

Legal institutions support and impede science and technology, thus they mirror the general public at large. In the future, legal institutions will face more issues involving science and technology. To handle those issues effectively, scientific and technological literacy in the legal community is required. Proponents of science and technology should strive to foster development of technical literacy in the legal community. Legal institutions possessing greater scientific literacy will create a legal environment more conducive to effective science and technology. Those institutions are also likely to influence the public to develop more realistic perceptions of the value of science and technology.

Key Words: law, science literacy

Text

Courts, legislatures, regulatory agencies, and other legal institutions now commonly rely on science and technology as they perform their public interest functions. For example, courts and law enforcement authorities now widely use forensic science and technology to resolve criminal cases. DNA testing is one example of a set of scientific and technological principles and techniques that is commonly applied by legal institutions in their ordinary course of business. Legal authorities also now routinely make use of computer simulation and modeling technologies to analyze cases and to present cases in court.

Science and technology now play critical roles in the development and enforcement of regulations that comprise administrative law. Standards for environmental quality, pharmaceutical product safety and efficacy, and food quality are widely recognized examples of science and technology applied by government to establish and enforce regulatory law. Regulations identifying threats to public health and safety, and those that establish standards of enforcement to control the threats, rely on science and technology as the key components supporting and sustaining the framework of regulations.

Although legal institutions now actively use and rely on science and technology to serve the public interest, those institutions also reflect uncertainty and fear as to

certain aspects of science and technology. For example, in some jurisdictions, legal limitations have been imposed on genetically modified organisms, including food products. Some governments have established legal constraints on research associated with human cloning. Authorities have also begun to consider potential limitations on other developing technologies and fields of research, such as nanotechnology.

It appears that legal institutions have an ambivalent view of science and technology which mirrors the ambivalence felt by the general public. Just as the public is eager to make use of the benefits and advantages afforded by advances in science and technology, so too are legal institutions active consumers of those advances. Simultaneously, however, both the general public and the legal community harbor concerns that occasionally surface as fear of science and technology, and their consequences. That there is consistency between the perceptions of science and technology held by the legal community and those held by the general public should not surprise us, as our legal institutions are populated by ordinary citizens. However, the implications of legal community ambivalence as to the potential impact of science and technology are significant.

Legal institutions affect the conduct of science and the development of technology through direct regulation. For example, in the United States, research involving human cloning has been significantly constrained by law. Actions of the legal community can directly impede scientific inquiry or technological development in specific fields. Law also controls topics such as intellectual property rights, research and development funding opportunities, and conflicts-of-interest, which have significant impact on technical initiatives. Thus, legal institutions frequently exert direct influence over activities in science and technology.

Legal institutions also exert indirect influence over public acceptance of science and technology. Legal institutions are commonly perceived to be conservative entities, thus for example when they choose to acknowledge or accept a scientific concept (e.g., DNA identification) or technology (e.g., electronic filing systems for court documents and other legal records), that acceptance generally enhances the credibility of the concept or technology in the eyes of the general public. Similarly, when legal institutions question or reject a scientific principle or technology, that action can significantly erode public confidence in the principle or technology.

Given this relationship between legal community acceptance of science and technology and general public support, proponents of science and technology should have an interest in cultivating legal community understanding and support for science and technology. A key step in cultivating support for science and technology in the legal community is promotion of scientific and technological literacy in the legal community. At present, the level of technical literacy in the legal community appears to be quite low. This condition is not surprising, as backgrounds of legal professionals, with a few exceptions such as intellectual property law specialists, do not commonly include significant technical training or experience. In the future, however, technical literacy will likely be increasingly

important for the legal community, as a growing number of the issues that community will face will have significant scientific and technological components.

The science and technology communities would thus be well served by working with the legal community to enhance the scientific and technological literacy of legal institutions. That effort would likely create a legal environment more supportive of scientific and technological initiatives. It is also likely to enlist the assistance of the legal community in promoting a more accurate and reasonable perception of science and technology in the eyes of the general public.

Parallel Session 27: Cultural differences in public understanding of sciences

MEASURING PUBLIC PERCEPTION OF SCIENCE IN IBERO AMERICA: THE RICYT/OEI'S STUDY AND ARGENTINA'S NATIONAL SURVEY

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Abstract

Surveys on public perception and scientific culture are regularly performed in many countries. This information is becoming more useful for the strategic decision-making process and promoting social participation and democratizing science and technology. Latin American countries are also doing a germinal effort to construct this type of indicators. This paper exhibits results of the first national survey in Argentina (SECYT, 2003), taking into account the experience accumulated by the methodological survey performed by RICYT and OEI in Argentina, Brazil, Uruguay and Spain. These indicators are important but it is still necessary to work on their conceptual dimensions and normalization.

Key words: indicators, public perception of science, national surveys.

Text

Context

Since 2001, RICYT and OEI have been developing together several studies on public perception, scientific culture and citizen participation in science & technology in order to produce specific regional indicators and to promote this kind of studies in Latin and Ibero American countries. The challenge is significant, since even when the importance of these indicators is acknowledged, there are no total agreements about their definition, construction and normalization yet, specially considering in some cases the debate on the international guidelines or the difficulties for their adaptation.

In November 2002, a comparative pilot survey was implemented by RICYT and OEI in cities of Argentina, Brazil, Uruguay and Spain to analyze perception of science & technology in terms of social imaginary, communication and citizen participation. The study joined different methodological approaches in order to

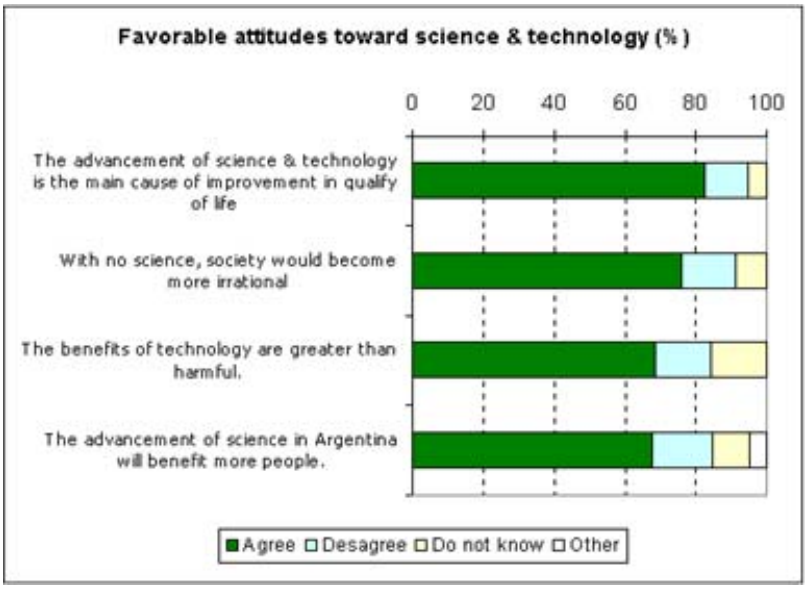
explore valid mechanisms to interpret public answers in this field of social research. The investigation allowed to confirm limitations in massive surveys to cover the linkages between science, technology and society; specially considering scientific culture in society includes not only public understanding and supporting science but a complex social, cultural and political framework. Moreover it showed the importance of developing qualitative studies and specific regional indicators which should allow international comparisons.

The RICYT and OEI's experience was used in the first national survey in Argentina, implemented by the Observatorio de Ciencia y Tecnología of the Secretaría Nacional de Ciencia, Tecnología e Innovación Productiva (SECYT), with researchers from Centro REDES. It includes 1,750 cases in 17 cities covering every region in the country.[1] We present here some results from data collection.

Results

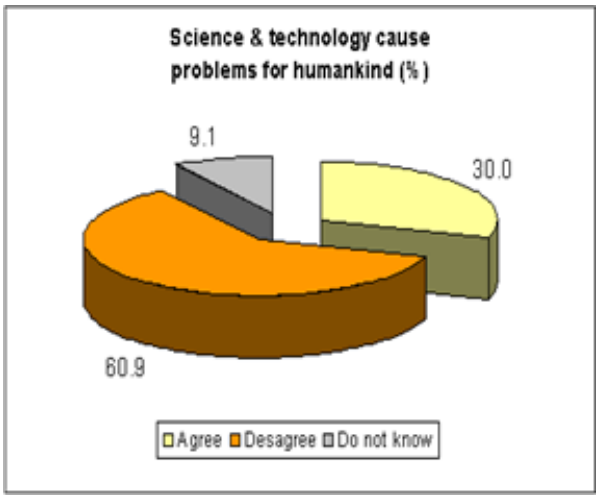
Most of the population in Argentina has favorable attitudes toward science and technology because they improve quality of life and the culture of the society (Graph 1).

Graph 1

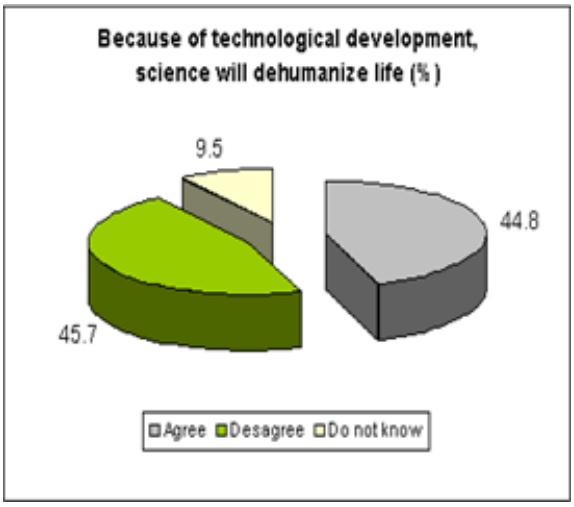


Nonetheless, an important proportion of the public shows precautionary attitudes regarding the consequences of scientific knowledge utilization. (Graphs 2 & 3)

Graph 2

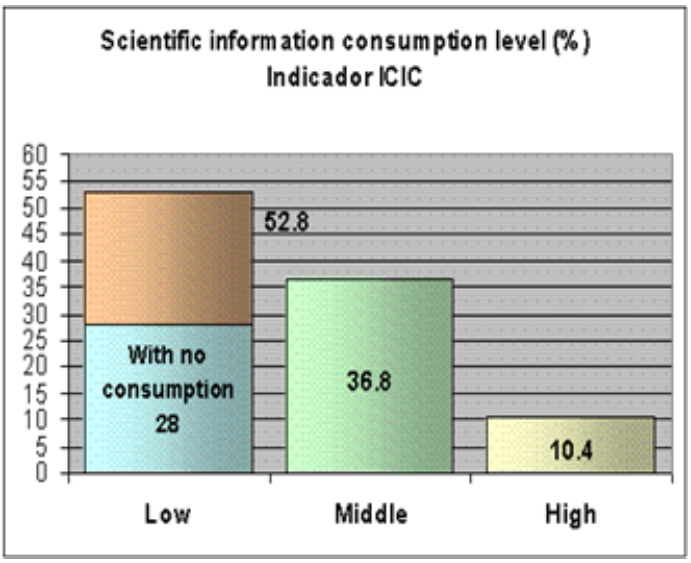


Graph 3



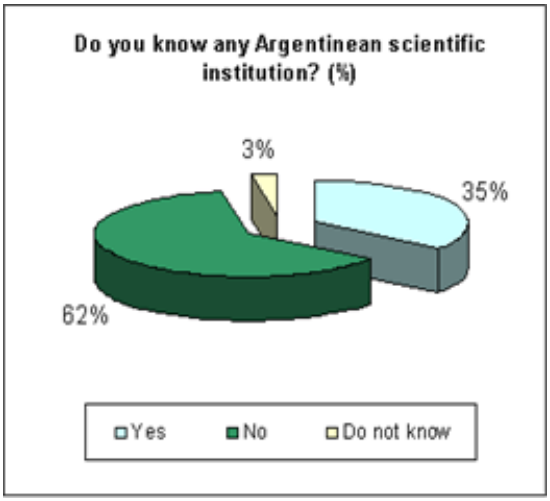
Science and technology, however, do not appear among the informative preferences of the Argentinean people. More than half of the population is poorly informed about science & technology issues. In fact, 22% has never had contact with specific information on science and technology.[2] (Graph 4)

Graph 4



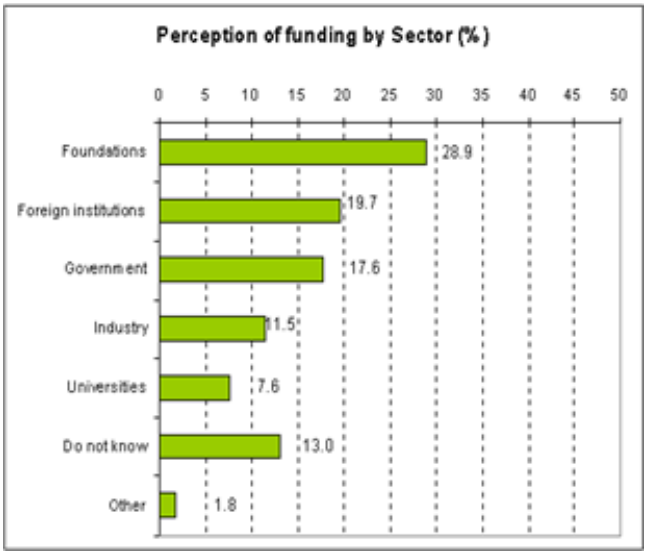
Most Argentineans (62%) do not recognize any scientific institutions in the country. (Graph 5)

Graph 5

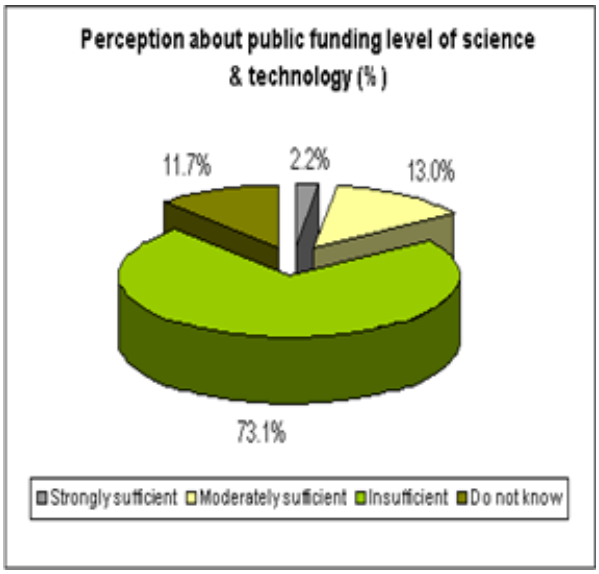


Science & technology in Argentina are supported principally by the public sector. Nonetheless, most of the society believes foundations and foreign institutions are at the top of the list as the main supporters (Graph 6). Also for 73% of the population, the Government does not finance scientific research sufficiently. (Graph 7)

Graph 6

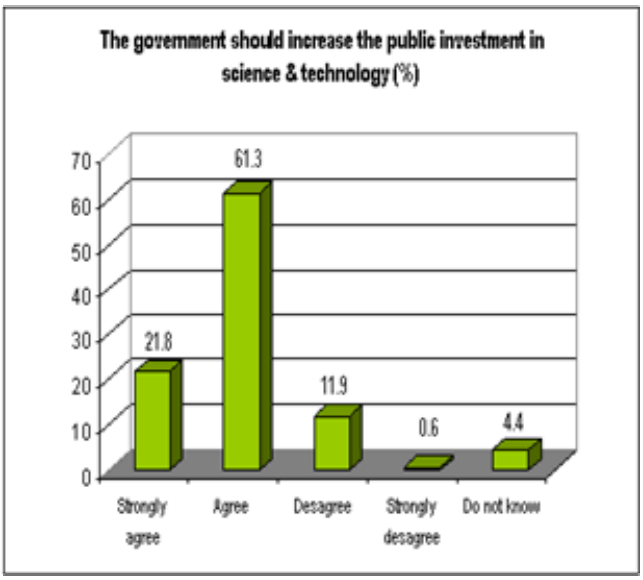


Graph 7



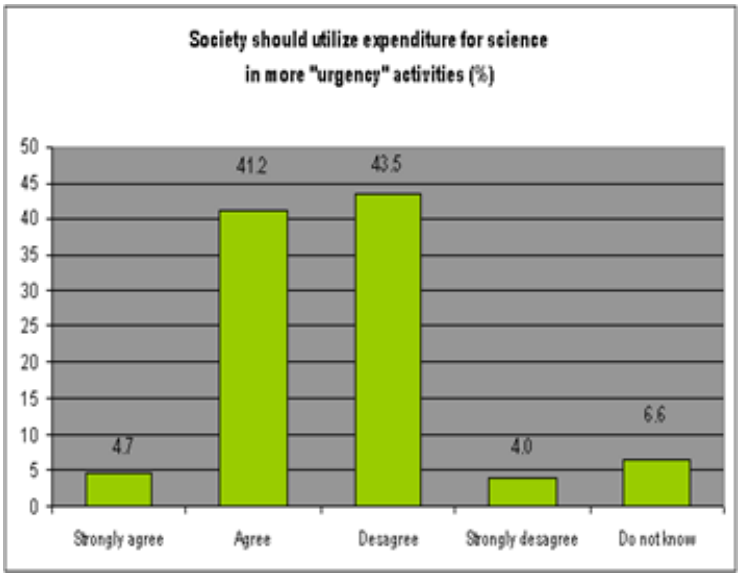
On the other hand, eight out of every ten Argentineans opines that the Government should increase public investment in science & technology. (Graph 8)

Graph 8



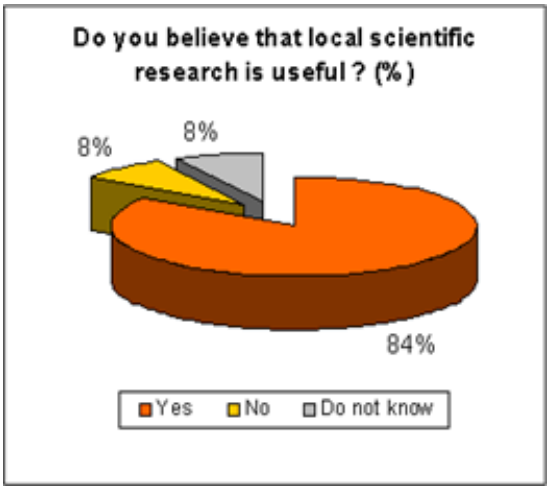
Nevertheless that priority becomes relative if we introduce the concept "urgency" for considering public policies: an important proportion of the public (46%) agrees on utilizing expenditure for science in more urgent activities. (Graph 9)

Graph 9



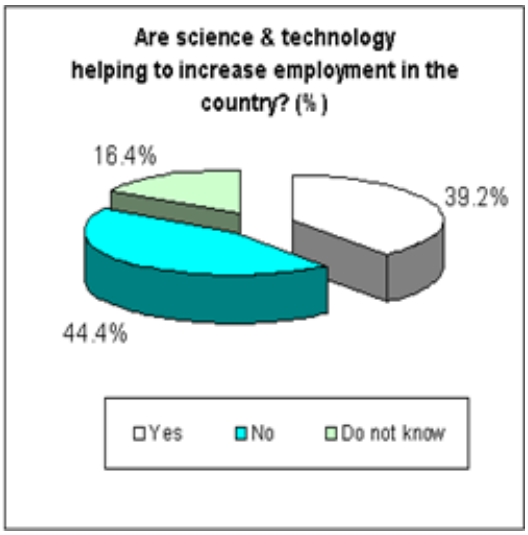
The vast majority of the society (84%) considers national scientific & technological research as useful. (Graph 10)

Graph 10



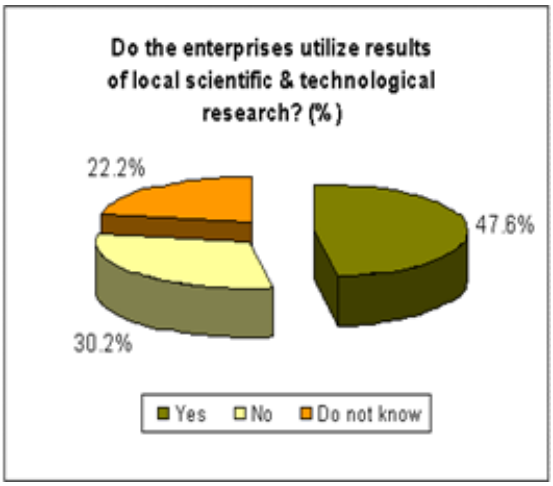
However, that perception does not show an effective knowledge of the usefulness of research because of limited public contact with the system of science & technology (little knowledge of institutions, low consumption of scientific information, etc.). Moreover, the idea of "usefulness" gets blurred faced with a specific issue: an important proportion of the population (44%) thinks that science & technology does not help to increase employment in the country. (Graph 11)

Graph 11



A figure close to half of the population thinks that enterprises use the results of local research. But this is a topic where there is a high ignorance about concreting utilization. (Graph 12)

Graph 12



That valorization, furthermore, coexists with the equally majority opinion of society about the low participation of enterprises both to support and develop research in the country.

Conclusions

The Argentinean society considers science both as a central cultural value and prestigious institution which, in general terms, increases quality of life. However, there is a considerable distance between the system of science & technology and the Argentinean society. Basically, the public has passive attitudes toward scientific & technological information as a periodic pattern of personal consumption of information. In addition, most of society does not recognize either local institutions of S&T or the public sector role as the principal supporter of the local activity research. Moreover, the idea of "usefulness" of the local generated knowledge is more potential than effective. It is necessary, in that sense, to promote strategies for science communication in society for installing in the public opinion a greater appropriation of science & technology. It is an especially important topic: along with favorable attitudes there are reservations that public policies must not neglect. It is central to give to the public elements both to evaluate local S&T capacities and introduce S&T in a real national social, political and cultural context.

[1] Margin of error: ±2.5%, level of confidence: 95%.

[2] The ICIC Indicator is an aggregate to view public disposition toward scientific & technological consumption of information. This indicator was constructed using the answer to two variables: consumption of newspapers and television.

Parallel Session 27: **Cultural differences in public understanding of science**

PUBLIC UNDERSTANDING, SCIENTIFIC CULTURE PERCEPTION AND CIVIC ENGAGEMENT INDICATORS

INDICADORES DE PERCEPCIÓN PÚBLICA, CULTURA CIENTÍFICA Y PARTICIPACIÓN CIUDADANA

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Abstract

The aim of this communication is to present the results of a survey about Public Understanding, Scientific Culture Perception and Civic Engagement in Science and Technology. The main group opinion trends of the survey are depicted. Besides, central conclusions regarding public knowledge and attitudes about S&T in two Castilla y León cities (Salamanca and Valladolid) are showed.

Key Words: Public Understanding of Science, Science Literacy

Text

Context

During February 2003 a survey conducted by The Ibero-American Network for Science and Technology Indicators (RICYT/CYTED) and the Organization of Ibero-American States (OEI), was made in two cities of Castilla y León, Salamanca and Valladolid. The inquiry was part of an international project that included surveys from South American States. The inquiry, a block of 52 items, focused on the usual five groups of questions in Science Literacy: General Attitudes to S&T, the Spanish case of S&T, Civic Engagement in S&T activities, Scientific Information Resources and Scientific Literacy.

Objective

The objective has been to measure the public understanding and attitudes towards S&T and scientific literacy in Spain. We have analyzed and processed surveys polled to university students and graduated people. We have collected and identified general public's attitudes toward S&T. The results were sent to RICYT/REDES (Centre for Studies about Science, Development and Higher Education)

Methods

The survey method was trough interviews conducted by surveyors (face-to-face interviews).

Survey Features:

(1) Designed samples: 150

(2) Target population:

Men and women graduated (26’6 %) or University students (73’3 %)

(3) Sampling method:

Random sampling. To identify correlations between elements such as gender and educational background (See Table 1).

Conclusions

The survey about Public Understanding of Science and Technology reveals that polled people have a positive perception and attitude towards S&T, and acknowledges the benefits from S&T as more important than risk and pervasive damages. However, they feel cautious about developments of S&T progress. This cautious realistic attitude to S&T cannot be described as merely an ingenuous one, because it cannot be taken as meaning that S&T have an unlimited power of solving social problems.

On the other hand, the survey mirrors a scarcity of information about scientific topics, as well as a low consulting rate of specialized publications and programs (TV, Radio, etc.). Nonetheless, there is a high percentage of correct answers with regard to scientific literacy. It is remarkable the difference between Science and Humanities students in relation to consumption of S&T information. Polled people do not consider themselves well informed in S&T subjects, especially humanities students.

Regarding citizens participation in S&T derived problems, the survey indicates a low level of active involvement. However, the majority of polled people consider that both citizen participation and concern about S&T impacts and their pervasive effects on social structures and daily life of individuals are relevant matter. Furthermore, the main subjects of concern are quality of life, health and some specific questions as AIDS, cancer, environmental change and pollution.

The shortage of technical knowledge is regarded by polled people as their main handicap to participate and get involved in social decision taking processes. Most people consider Science is valuable for Society.

People adopt a pragmatic attitude when they face scientific questions: health and medicine are considered the most relevant researching activities. These subjects get a high level of concern by polled people. The survey describes a wrong perception of the origins of S&T sources of financial support in Spain. According to such perception, S&T would receive the majority of its financial support from the private sphere. This fact reveals that most people do not really know the rates of public and private financing S&T. The perception of Public Institutions and S&T funding is basically seen as related to Private Institutions, and less to Government Institutions.

Taking into account the Spanish situation, the survey indicates a negative perception of Spanish Government's promotion of S&T. Paradoxically, despite the actual public investments, most of polled people points to the low support of researching by the Government as the main reason to explain the problems of R+D activities in Spain. In fact, actual data show that Public Institutions' rate of researching and S&T funding is more important than the Private Institutions.

Figures and Tables:

Table 1

GRADUATED/ STUDENT	GENDER (F/M)	SCIENCE	HUMANITIES	%
Students	F	20,67%	34,67%	55,33%
	M	9,33%	8,67%	18,00%
% Students		30,00%	43,33%	**73,33%**
Graduated	F	9,33%	4,00%	13,33%
	M	6,00%	7,33%	13,33%
% Graduated		15,33%	11,33%	**26,67%**
%		**45,33%**	**54,67%**	100,00%

Parallel Session 27: Cultural differences in public understanding of science

SOCIAL PERCEPTION OF THE SCIENCE AND THE TECHNOLOGY IN THE CITY OF MELILLA

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Abstract

The public perception of Science and Technology has been an object of evaluation in numerous countries. Generally it is a question of interviews or polls orientated as criteria elaborated by the USA National Science Foundation. In the present work results on public perception of Science and Technology in the city of Melilla are exposed, focusing the need to incorporate the cultural origin as variable, since in the works consulted variables of genre, socioeconomic level or grade of formation are included, without laking account of the tendency of the industrialized countries towards multicultural societies.

Key words: Public understanding, cultural diversity, citizen participation.

Text

Context and precedents

In a recent study (Cabo y Enrique, 2004) on the concept of Multicultural Science we synthesize numerous works published in the context of the Science Education where the existence of two views evident for the Science from the cultural diversity: the universaslist orientation and the multicultural orientation. The first can be supported for several reasons, for example, to undestand that Science and Technology are immune to cultural influences or, on the contrary, to believe that Science and Technology have advanced thanks to the contributions of multiple cultures. On the other hand, the multiculturalist orientation supports that Science, as sociocultural practices, have its origin in the western European culture and, therefore, its assimilation can collide with not western cultures. This debate, open and polemic, is not included in the works consulted on social perception, although in this context the existence of cultural influential factors is supported, for example, to criticize the *model of cognitive deficit* whose results are interpreted on social perception of Science and Technology.

This work is framed in the research promoted from the Facultad de Educación y Humanidades de Melilla and orientated towards the public divulgation of knowledge. The first phase of the project involves the evaluation of the offer

and the demand of knowledge on the part of the local population, Science and Technology from us.

Objective

The basic target of this work is to identify possible differences in the social perception on Science and Technology among samples of population of Muslim and Christian origin in order to find empirical evidences that support the need to include the "cultural origin" in the analyses of social perception of Science and Technology according to the general tendency towards the multicultural societies in the industrialized countries, particulary in Melilla.

Methods

Seventy six interviews was performed face to face following the same protocol of questions as in the poll published by the FECYT in 2003, on social perception of Science and Technology in Spain, which was not fullfilled in the cases of Melilla and Ceuta.

The results of part of the chosen questionnaire are exposed here: grade of interest and of information about Science and Technology topics, sources of information used, professionals´ credibility, attitudes towards the Science and Technology and evaluations on the benefits and the need of public finance. We will establish a previous diagnosis in order to elaborate a program of public divulgation of the Science and the Technology in Melilla.

Results and conclusions

The general results obtained in Melilla do not show big differences compared with the results of the State and other national studies. Therefore we can state that the interest, attitudes and expectations towards the Science and the Technology are positive, but the grade of knowledge or information is low.

In the sample from Melilla, the negative consequences of the scientific and technological development related to environment are feeling in a lower grade, and lower confidence in social organizations such as ONG´s, consumer´s association and in a lower proportion in ecologist associations.

In the literature consulted on public perception of the Science and the Technology, the differences observed in relation to the genre, the grade of formation and socioeconomic level, are analyzed, however the cultural origin of the sample is not analyzed. In Melilla, where the majority of the population is Muslim or Christian, the religion is a good indicator of the cultural origin of the population, being able to state that the origin of the Chiristian community it is the Spanish western culture and of the the Muslim community is Tamazight or Rifeña culture, it is North African origin.

We found differences between the Muslim and Christian population, characterized for a major interest and information about for topics of medicine and health, major percentage (more than 25%) of "does not know, does not answer", and different credibility in professionals in the case of Muslims. The attitudes and expectations towards the Science and Technology are positive in both religious communities. For all these reasons we believe that it is necessary to include the "cultural origin" in the analyses of social perception of Science and Technology.

References

AAVV (2003). Percepción Social de la Ciencia y la Tecnología en España. Madrid , FECYT.

Cabo, J. y Enrique, C. (2004). Hacia un modelo de Ciencia Multicultural. Enseñanza de las Ciencias. Vol. 22(1), pp. 137-146.

Nacional Science Foundation (2000). Science and engineering indicaters – 1998, Washington, NSF.

OEI y RICYT (2003). Proyecto de indicadores de Percepción Pública, Cultura Científica y Participación Ciudadana. Revista Iberoamericana de Ciencia, Tecnología, Sociedad e Innovación.

http://www.campus-oei.org/revistactsi/numero5/documentos1.htm

Polino, C.; Fazio, M.E. y Vaccarezza, L. (2003). Medir la percepción pública de la Ciencia en los países Iberoamericanos. Aproximación a problemas conceptuales. Revista Iberoamericana de Ciencia, Tecnología, Sociedad e Innovación.

http://www.campus-oei.org/revistactsi/numero5/articulo1.htm

Parallel Session 27: Cultural Differences in Public Understanding of Sciences

COMMUNICATING CLIMATE CHANGE: CHALLENGES POSED BY THE DIVERGENCE IN LAY AND EXPERT UNDERSTANDING

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Abstract

Building on previous PCST research which highlights the role of contextual factors in determining lay conceptions, this study examines the UK public's understanding of climate change. Findings from interviews and a major survey expose the heterogeneity in lay understanding about the issue due to individual and social influences. The results also show a clear divergence between lay and expert opinion where knowledge of other environmental, and broader cultural discourses are central in determining lay perceptions of, and response to, climate change. This research shows the need for communication which adopts relational strategies to highlight the relevance of climate change in terms with which people identify.

Key words: Climate change, public understanding of science

Context

The UK government has been keen to demonstrate its commitment to tackling climate change. However, attempts to inform the UK public about climate change and to encourage energy conservation have had little impact on individuals' understanding or behaviour (Park et al., 2002). Studies suggest there are notable differences between public understanding of climate change and expert accounts. Lay perceptions of climate change are often related to moral concerns, for example about global inequality (Darier & Schule, 1999), or conceptually integrated with other environmental issues (Hargreaves et al., 2003).

Research in PCST indicates that personal, social and institutional context determine how information is interpreted and used (Wynne, 1991). Acceptance of environmental information is influenced by perceptions of relevance, credibility, trust, individual efficacy and responsibility (Eden, 1993; Burgess et al., 1998). Global risks, such as climate change, are inevitably more difficult to communicate, because their relevance to everyday concerns, actions and experience is not necessarily evident, and responding to them may involve sacrificing highly symbolic aspects of modern lifestyles (Kempton,

1991).

If communicating climate change is to be effective, there needs to be a greater understanding of the context in which publics perceive the issue.

Objective

This research examines the contextual determinants and dimensions of public understanding of climate change, including any disparity with scientific conceptions.

Methodology

The research comprises qualitative interviews (N=24) and a postal survey of residents in Hampshire, UK (N=589; representing 33.3% response rate). The postal questionnaire addressed themes that emerged during the interviews and included qualitative and quantitative questions. Stratified random sampling was applied to ensure a representative and demographically diverse sample. Analysis included thematic analysis (for qualitative data) and T-tests/Chi-square tests, regression and factor analyses (for quantitative data).

Results

Both the interview and survey data highlight the considerable variation in understanding climate change - both in terms of people's level of knowledge and their conceptions, language and attitudes. This heterogeneity reflects a dynamic process of constructing understanding (evidenced in interviews) and the diverse characteristics of respondents. Analysis reveals participants' background (e.g. gender, age), educational level and experience significantly influence understanding and attitudes. These individual and social influences on lay conceptions of climate change contribute to a divergence with expert accounts.

As anticipated, respondents often conceptually integrated climate change with other environmental issues, particularly ozone depletion. Participants' (particularly women's) understanding was often related to directly-experienced phenomena, particularly air pollution and weather. In some cases, climate change was understood in moral terms - that is, the issue was seen as indicative of modern society's dysfunctional relationship with the environment. There was also a sense that controls should be implemented to ensure an equitable approach to tackling the issue.

The overlapping issues of uncertainty and distrust of information were central in determining interviewees' perceptions of, and response to, climate change. Analysis of the interview and survey data[1] revealed the dimensions of uncertainty and distrust included:

- Feeling under-informed or unsure of one's own knowledge (particularly amongst older respondents);

- Ambivalence (particularly amongst men and more qualified respondents) about the reality of anthropogenic climate change due to perceived

uncertainty or dispute among the scientific community and exaggerated or dubious claims made by the media or scientists.

In contrast to second-hand information, respondents trusted the evidence of their senses: those whose health had been affected by air pollution or who believed the weather is changing tended to be more certain of the reality of climate change.

Conclusions

Consistent with previous research in PCST and constructivist theories of learning (e.g., Scott, 1987), this study suggests an individualised, context-dependent process of constructing understanding. Lay-expert divergence in understanding climate change can be understood in terms of different ways of constructing meaning (Bruner, 1986): in contrast to abstract, scientific knowledge, lay understanding is relational. Accordingly, effective communication must adopt relational strategies to highlight the relevance of climate change to people's lives in terms with which they identify.

In addition, this research provides evidence of how the public evaluates information about climate change. Disparity between the UK government's exhortations for individuals to reduce their energy consumption and widely-reported political and scientific debate over climate change is likely to undermine public trust in climate change information.

Notes

1. Factor analysis of the quantitative data revealed uncertainty to be the strongest and most reliable (alpha=0.66) dimension of respondents' attitudes.

References

Bruner, J. (1986). Actual Minds, Possible Worlds. Cambridge, Massachusetts: Harvard University Press.

Burgess, J., Harrison, C., & Filius, P. (1998). Environmental communication and the cultural politics of environmental citizenship. Environment and Planning A, 30, 1445-1460.

Darier, E. & Schule, R. (1999). 'Think Globally, Act Locally'? Climate change and public participation in Manchester and Frankfurt. Local Environment, 4(3), 317-329.

Eden, S.E. (1993). Individual environmental responsibility and its role in public environmentalism. Environment and Planning A, 25, 1743-1758

Hargreaves, I., Lewis, J. & Speers, T. (2003). Towards a Better Map: Science, the public and the media. London: Economic and Social Research Council.

Kempton, W. (1991). Lay Perspectives on Global Climate Change. Global Environmental Change, 1(3), 183-208.

Park, A., Curtice, J., Thomson, K., Jarvis, L. & Bromley, C. (Eds.) (2002). British Social Attitudes, the 19th Report. London: Sage.

Scott, P. (1987) A Constructivist View of Learning and Teaching in Science. Leeds: University of Leeds.

Wynne, B. (1991). Knowledges in context. Science, Technology and Human Values, 16(1), 111-121.

Parallel Session 27: Cultural Differences in Public Understanding of Sciences

SCIENTIFIC CITIZENSHIP CULTURE. A LATINOAMERICAN VIEW

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Abstract

"The modern democracies are transformed and the citizenship concept are changed at the time of uncertainly, new technologies, new forms of economic relations and new relation of media and the quotidian life. This is the time of mass media, citizenship and communicative management in the public scene. The information societies are protagonist of communicative networks, in the identities formation, changing our quotidian life, our ideas of world, transforming the development of learning and scientific activity and influent our collectives imaginaries.

The idea of science communication has been developed since the concept of community science including models as Public Understanding of Science and Public Participation of Science and the model of Scientific and Technology Alphabetization of Fourez (1997).

In the Latin American societies with social and economic difficulties we consider the idea of propose a new model of social communication of science, more contemplative with the special characteristics of this context and the relations-tension between science and local communities. We call this on-building model as: Scientific Citizenship Culture. This model of social communication of the science think in the social communication of the science as process, product and culture with the idea to promote the development of the local societies, organise the local actors, development the connections to democratise the scientific knowledge, the exchange fluxes, the division of works to facilitate the work, the institutional autonomy as guarantee of democracy and good intervention and the promotion of energies exogen and endogeny to promote the cognitive synergies."