40. A Study on Science Popularization Work in Community from View of "Last Mile"–Take a Case of Science Popularized Community in Beijing

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Abstract. Based on the investigations and interviews among totally of 123 science popularized communities in Beijing from 2007 to 2010, this paper mainly discusses science popularization work in community from the view of "last mile". According to the general communication model of mass media, there are four basic elements during a communication procedure: information sender, information, communication channel, and information receiver. The paper first talks about the present situation of four aspects of science popularization work in community. Then, the paper analyses the problems existing in the popularization work in community concerning the four aspects. On the basis of some theoretical analysis such as pluralism of subjects and two-way communications in the science popularization, the paper last gives some concrete suggestions for the future development of science popularization work in community.

Keywords: Science popularization; Community; Last mile

Background

Since 2007, I have attended the evaluation of totally 123 science popularized communities in Beijing annually, and I have investigated and interviewed half of these communities on-the-spot. Based on these investigations and interviews, this paper mainly discusses science popularization work in community from the view of "last mile" ---- which means to change the traditional view of up down to the view of bottom up concerning science popularization work.

According to the general communication model of mass media, there are four basic elements during a communication procedure: information sender, information (content), communication channel, and information receiver as following:

information sender → information → communication channel → information receiver

model (1)

As science popularization work in community is concerned, the four basic elements and questions we would like to analyze are as following: subject of science popularization–who sends the information, information of science popularization–what is the content, communication channel of science popularization–by which channels the information is sent, and object of science popularization–to whom the information goes.

Situation of science popularization work in community

In this part, we will talk about the present situation of four aspects of science popularization work in Beijing communities:

Subject of science popularization, usually there is no professionals for the science popularization work in the community, few of the people who are responsible for this work have the relative higher education background or academic training opportunities. As a result, most of the people who are responsible for the science popularization work in the community have little recognition about science popularization, and there is no need to mention the new trends and new methods being used by them.

Content of science popularization, the change rates of contents in the most communities are from once a season to once a half year or a whole year, some communities even have never changed the contents which are eternal as they said! Usually the communities can get some popularizing materials from local bureaus of government especially when there are public hot issues such as SARS in 2003, Olympic Games and earthquake in 2008, in their routine times there are no regular content support of science popularization from government. Some communities can get information of science popularization from books or internet, but even they can surf on internet, many of the workers still can not judge which information are right facing so huge and various opinions on internet.

Communication channel of science popularization, with more and more money from government invested into the grass-root units many communities have built up "digital harbor"(with dozens of computers for residents surfing on internet), LED (Light Emitting Diode) panel to show the content electrically, and DIY(Do It Yourself) Corner with various instruments for science popularization activities, etc. However, with the government paying more attention to the advanced methods the traditional methods and channels of science popularization such as books, magazines, blackboard notice, are neglected in the communities.

Object of science popularization, generally speaking the ordinary residents in the communities are negative to the science popularization activities which shows as very small part of them attend the lectures(maybe they even don't know them) or go to "digital harbors" and libraries as most of these instruments are not opened normally and regularly. The other important reason is the activities, lectures, "digital harbors" are not connected with the daily life of the communities, and the local people also are not used to applying some new advanced techniques such as internet, electric books.

Problems existing in the popularization work in community

In this part, we will see the problems existing in the popularization work in community concerning the four aspects, which are mainly appeared as following:

The shortage of subject of science popularization work, there are not full time workers for this kind of work and also the have few opportunities to get professional and academic training. There is not a content support system for science popularization of the community from outside such as government, university, or academic association, etc., as a result the community has no capability to find and choose right, enough and suitable information for routine science popularization work.

Too much attention on advanced channels and neglect of traditional ones of science popularization, such as newspaper, magazines and books which are still the important even the main ways for especially elders and people in rural areas to get science and technology information in their daily life, they are not used to so called "advanced channels" as internet. Ordinary people in community have small chance to participate the science popularization work, usually there is few care about their needs, expectations, feelings and habits concerning science and technology by the traditional popularization way of up down.

Theoretical analysis of popularization work in community

The new orientation of popularization of science

According to the traditional notion, the aim and main function of science popularization (SP) are just how to improve the scientific knowledge level of the public. And of course scientists are only authoritative experts who can popularize the science to the general public, which also supports the opinion that SP is a uni-direction knowledge flow from scientists to public.

The investigations of Chinese civil (from 18 to 69 years old) science literacy (SL) by Chinese Association for Science and Technology (CAST) have held individually in 1992,1994,1996, 2001, 2003, 2005, but only in 2001 and 2003 the reports of investigation were published. From the results of these two investigations we can see that the Chinese civil science literacy level increased obviously with the increasing number of formal education years of the public in school:

Table. The SL level (%) of Chinese people with different formal education stage

Investigation Year / SL / education grade	Under primary school	Primary school	Middle school	High school or prof-school	College	University and above
2001	1.6	7.0	11.5	0.1	0.0	0.3
2003	6.2	10.7	13.5	0.0	0.0	1.5

Data resource:1 The Chinese civil SL investigation project team, The Investigation Report on Chinese civil Scientific Literacy in 2001, Beijing: Publishing House of Science Popularization, 2002, P60; 2 The Chinese civil SL investigation project team, The Investigation Report on Chinese civil Scientific Literacy in 2003, Beijing: Publishing House of Science Popularization, 2004, P20

In China the general public accepting the systematic science formal education in school is only beginning at middle school stage, which means Chinese people who have just primary or under primary education in school or

kindergarten could not get the science education experience, and these kind of people in China are more than 100 millions far more than the whole population of Germany. The SL level of these people, which contributed mainly by SP during their life span from 18 to 69, is nearly zero according to the investigations in both 2001 and 2003. So, if taking China for example, according to several investigations of civil science literacy by CAST, PS in fact contributes very little to the improvement of scientific knowledge level of public especially compared with the formal science education in school.

In fact, general public is not the school student, on one side, they have not enough time and energy to continue to learn so huge amount of scientific knowledge, and on the other side, the interests and needs of public to science are so various and change frequently during their life span that just to improve the scientific knowledge level of public is definitely not a cure-all.

As a result now we'd better get a new orientation of PS today which means instead of asking people to get to master more and more science knowledge, it's quite suitable for PS nowadays to meet various needs of public such as material benefits, recreation expectation, and democracy right etc. concerning science issues in modern society.

The role change of scientist in the popularization of science

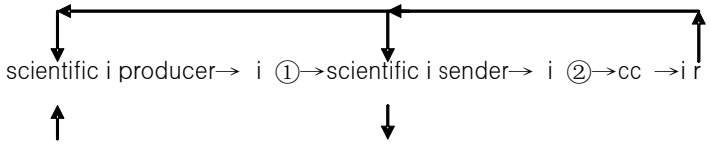
Since a long time ago, it's commonly accepted in the science community that scientists should act the subordinate role of the popularization of science. And it's true that in the history of science, scientists always play not only an important but also central role in the PS. Many most famous scientists engaged their lives in popularizing scientific knowledge to the ordinary people as they realized that popular science work was an inalienable part of their scientific research activities. Thanks to their endeavors, more and more general people turned to accept, support, and even like science. Just as Carl Sagan objectively appraised Isaac Asimov in 1992 that we never know how many scientists working at the scientific frontiers got their initial inspiration through a book, an article, or a story written by Asimov, we neither know how many ordinary people support the science at the same reason.

From model (1) which we mentioned in Background, we can see that the information sender sends the information through the communication channel to the information receiver. But, in this traditional model there is a tacit premise which means that information producer is also the information sender, they are the same one. This is common in the general news report, the journalist is both the information producer and the information sender. And it's also the case that in the early time of SP scientists played as both the scientific information producer and the scientific information sender, the most representative figures were such as Galieo, Michael Faraday and also the Royal Society of UK.

However, nowadays the popularization of science has been showing new characteristics. First, in the information and networking society, especially due to the appearance of television and internet, the mass media is playing an increasingly prominent role in the PS as mass media has become the first choice for public getting scientific information on one side, and scientists have to rely on mass media today to do some popular science works on the other side. Second, popularization of science is also becoming a professional area as science communication becomes a major for more and more college students, the content and style of PS also changed too which maybe a bigger and bigger challenge to scientists. Take the content for example, according to an investigation by Royal Society of UK on the attitude of scientists and engineers to science communication to public, "three quarters of the scientists feel able to communicate their own research, whereas slightly less than half of them feel that that they are able to communicate the social and ethic implications of their research ". These new changes will surely affect the ways and traditional role of scientists in the popularization of science.

In the modern activities of SP, we can often see that the scientific information producer and the scientific information sender have been separated. Scientific journalist, as the scientific information sender, more and more faces directly to the public than the scientist, and the latter as the scientific information producer, is often behind the journalist and provides various professional helps to him. So today it's not difficult to see a diversity and specialization trend of subjects of popularization of science.

And then we suggest a new model of scientific communication as following:



i: information
cc: communication channel

model (2)

In model (2), we divide “information sender” in model (1) into two parts: scientific information producer and scientific information sender; and divide “information” in model (1) into two parts too: information **j** and information **k**. And form model (2) we still can see the feedback from information receiver to both scientific information producer and scientific information sender, and feedback from scientific information sender to scientific information producer too.

From the new model of scientific communication, we can conclude that mass media workers (including scientific journalists, scientific editors, popular science writers, organizers of popular science work, etc.) who as the scientific information sender will be the main, direct and professional subject of popularization of science. Scientists, while as the scientific information producer, will be the indirect and unprofessional subject of popular science work.

So, the diversity and specialization trend of subjects of popularization of science are unavoidable especially due to the mass media development in this scientific and democratic society, the traditional role of scientist in the popularization activity of science would also be changed accordingly. Scientific community has to face this reality and adapt to the new trend of the SP.

Conclusions and Suggestions

In recent years, with more and more money from government invested into the grass-root units many communities have got advanced hard wares for science popularization works, however with the delay of soft ware construction such as content system, professional training, operation and evaluation mechanism of science popularization, etc., some new problems gradually appear and some old problems are still there in the communities.

Based on the investigations and analysis, we give some concrete suggestions for the future development of science popularization work in community, mainly as: Training professional workers annually for the science popularization in communities, and also training scientific journalists, writers and exhibitionists for communities.

Providing science contents steadily from scientific authorities for the communities such as building science popularization content database or S&T medias, which also should concern with the daily life of different communities. Building up various communication channels for science popularization including both advanced and traditional ways in communities. And lastly inviting local people of the communities participating in the program and evaluation of science popularization work as the bottoms-up way asks.

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