Outline

Research on the Promotion of Public Understanding of Science & Technology and science communication

(Research Material-100)

Masataka Watanabe, Kan Imai
2nd Policy-Oriented Research Group
National Institute of Science and Technology Policy
Ministry of Education, Culture, Sports, Science and Technology

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1. Main Point of this Report

The main point of this report lies in (i) reconfirming the importance of individuals' increasing their understanding on science & technology and acquiring positive interest, correct understanding, and appropriate utilization skills of such technologies (science literacy) as well as (ii) proposing a measure to increase knowledge and improve science literacy. The measure is to introduce a system of training and utilizing "science communicators" in order to activate science communication.

In every aspect of our daily life, we enjoy the benefit of state-of-the-art science & technology. However, the result of TIMSS-R of "the third international survey on mathematical and science education", conducted in 1999 for junior high school students in 38 countries, shows that, although the grades of Japanese students (8th grade) is in the top group both in terms of mathematics and science, regarding the questions on whether or not they liked these subjects, the ratio of those students who answered "yes" was ranked among the lowest group. "The study on implementation of educational curricular" conducted in December 2002 by the National Institute for Educational Policy Research also revealed that the number of students who liked science decreased as their age went up.

In addition, an international comparison of "survey on awareness of science & technology" conducted for adults (over 18 years old) proved that the Japanese had generally lower level of interest in science & technology and understanding on the basic concepts than the people in Western countries.

To synthesize the results of the surveys cited above, we have to be concerned that, if the current situations continue, the gap between research and development of science & technology and interests/ knowledge/ understanding of the general public towards science & technology could further expand. This not only is a loss to our country but also could be a major hindrance for individual Japanese to lead a satisfied life.

2. Necessity and utility of promoting the public understanding of science & technology

Provided we live in the era when we cannot do without benefits of science & technology, we should pay attention to the direction science & technology are seeking as well as enjoy their benefits to the maximum. However, particularly younger generation does not have much interest in information on science & technology (Figure 1).

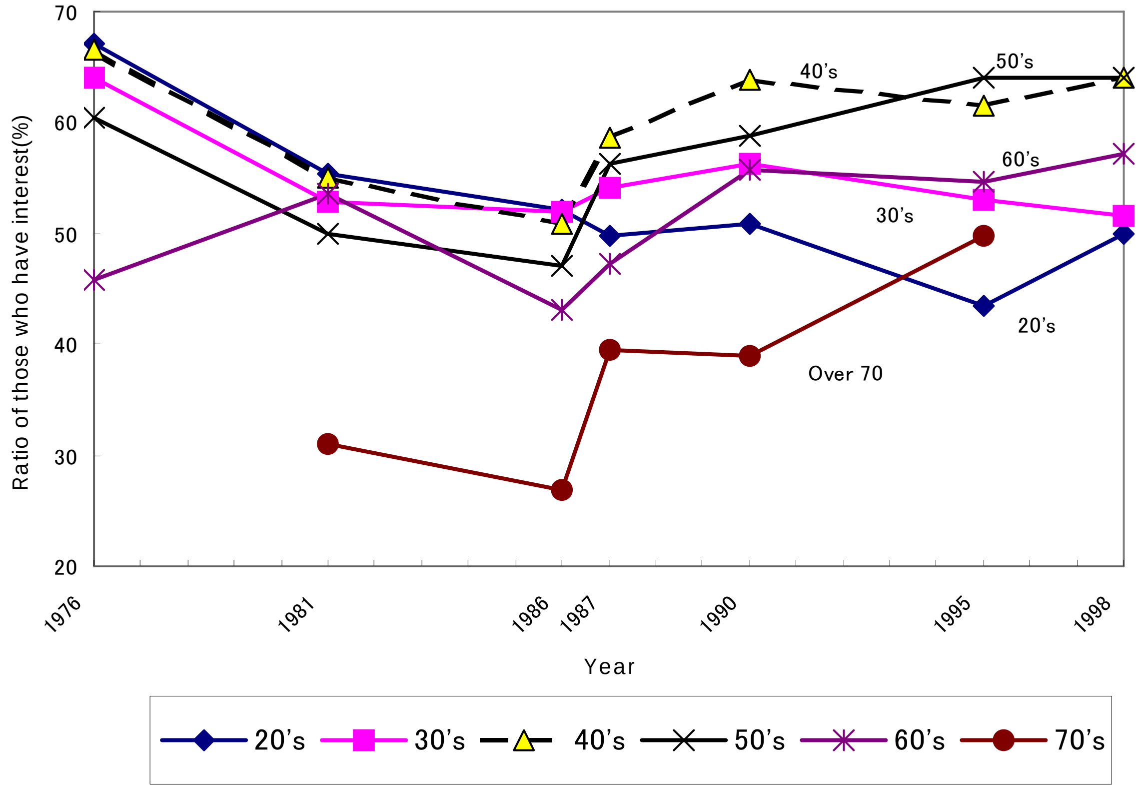

Figure 1 Transition of interest in information on science & technology by age

*"60's" includes "more than 70" in 1976 and 1998

Source: Polls conducted by Prime Minister's Office in 1976, 1981, 1986, 1987, 1990, 1995, and 1998

This might be because the necessity of promoting interest/ understanding towards science & technology is not well announced. Thus, we have reexamined such necessity as summarized below.

1. Necessity at society level
   (1) If Japan is to continue to enhance the level of science & technology in the future, it is indispensable that the high level of general public's interest/ understanding towards science & technology should be sustained and a wide range of support for research and development be ensured.
   (2) Increase in the understanding on science & technology should signify that we get close to the achievement of the ideals of sustainable social development and democratic administration of science and technology policies.
   (3) Most importantly, only if the society as a whole shows interest and understanding towards science & technology, children could bear hope in the future and see scientists and engineers as an attractive occupation that could contribute to the society.

2. Necessity at individual level
   (1) Scientific thinking and methodologies are helpful in making rational judgment.
   (2) They contribute to maintaining good health etc.
   (3) They keep us from being deluded by false/ fraudulent science.
   (4) They can be usefully applied for cultivating our lives based on our own judgment.
   (5) They can be the source of enjoying science & technology as culture.

3. Necessity of activating science communication

What are the major factors that hinder promotion of general public's understanding on science & technology? In this regard, there are surveys on people's opinions (i.e. the poll conducted by Prime Minister's Office in 1995 and the the public attitudes survey conducted by the National Institute of Science and Technology Policy (NISTEP) in 2001). Both surveys show that, although more than 60% people think "Knowledge on science & technology is important even in our daily life" and "They can understand such knowledge if plainly explained", they also realize that "Not many institutions provide such plain explanation" (Figure 2).

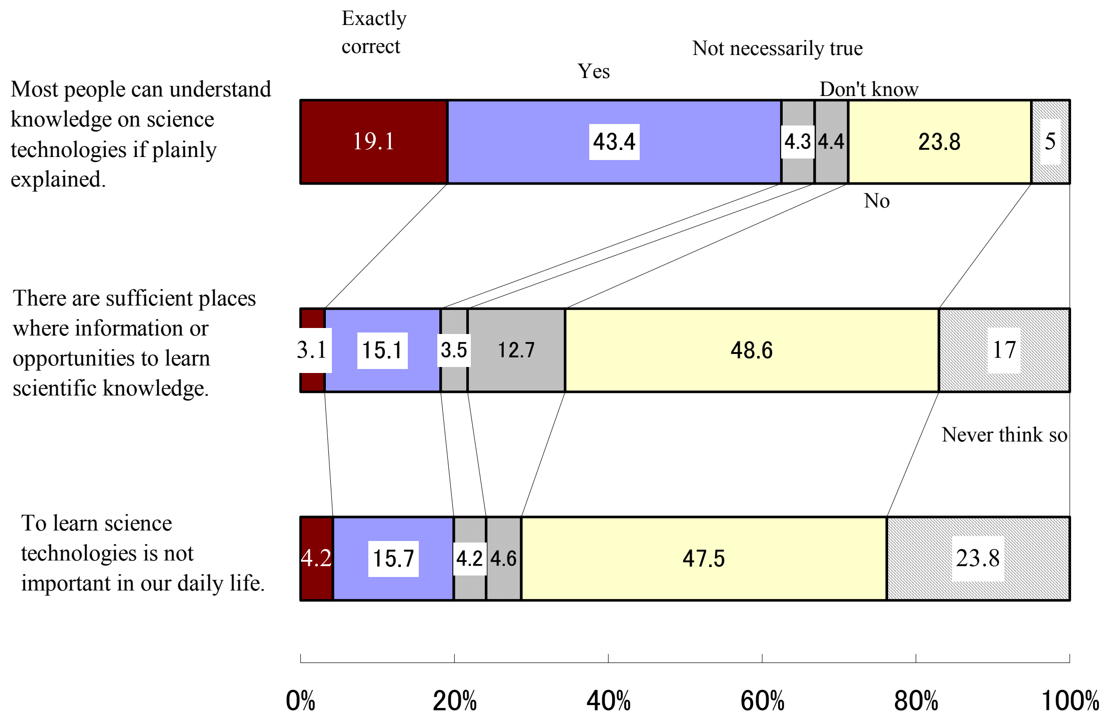

Figure 2: Opinions on Science & technology Information

Source: Poll on Science & technology and Society conducted by the Prime Minister's Office in 1995

However, even those who think that way do not seem to be making active efforts to obtain "easily understandable scientific information" on their own. This is because, in the survey that asked respondents' major sources of science & technology information (the poll conducted by the Prime Minister's office in 1998 and the public attitudes survey of NISTEP conducted in 2001), while around 90% respondents answered TV news and 60-70% answered newspaper articles, only less than half respondents referred to other media (both surveys adopted multiple answers).

As a reflection of this situation, in Japan, the number of publications of science magazines for the general public has decreased from as many as 10 magazines in 20 years ago to only a few today and the circulation is extremely limited in our country than in the US (see the "Survey on science magazines in Japan" (2003), Research Material 97 of NISTEP". For example, in the US, the circulation of the Scientific American was around 0.7 million in 2000, while that of its Japanese version, "The Nikkei Science", was only 25,000. (However, while the circulation of the American version is decreasing, that of the Nikkei Science is stable.)

However, these situations cannot be attributed only to the lack of interest of the general public. This is because, in the US, institutional settings for training and utilizing highly technical editors, science writers, staff of science museums, and publicity (outreach) staff of universities and research institutes are well advanced. On the contrary, such efforts are quite retarded in Japan.

4. How to Activate Science Communication

In order to send out accurate and understandable information on science & technology to the public, it is necessary to enhance the understanding on science & technology and communication capacity of all the senders and receivers of such information as well as intermediaries between them.

(1) The UK's efforts

The UK has a long history of enlightenment and dissemination activities in terms of science & technology including the establishment of British Association for the Advancement of Science (BA) in 1831. Nowadays, however, the way of enlightening the public or enhancing their understanding on science has been reconsidered as the activities for enhancing such understanding to date have proved not so effective as expected and the general public's distrust against science & technology administration and researchers has increased partly because the measures against BSE were not taken promptly enough. That is, instead of the previous way of simply teaching knowledge on science & technology in a top-down manner, the transparency of science & technology administration and state-of-the-art researches has been promoted and, at the same time, the dialog among researchers, media, and the general public came to be emphasized.

The specific measures that are given high priority include the following:

1. to encourage researchers who receive public research fund to be involved in activities for enhancing understanding and hold seminars for improving individual communication skills;
2. to hold science festivals, symposia, seminars, and workshops at institutions such as BA, provide public support for such events, and assist private foundations (Welcome Trust); and
3. science communicator training course (basically master's program of one year).

In terms of the third point, there are currently around 20 universities in the UK that have established a graduate school for training science communicators or media-related journalists. Reportedly, the classes center on seminars and the graduates find their jobs in various mass media, museums, organizations, and enterprises. In addition, there are post-doctoral researchers who find their career in various organizations, foundations, and administrative institutions.

(2) The US's efforts

Although the US has a long history of journalist education, many graduate schools specialized in training science journalists and science writers were established after the atomic power plant in the Three Mile Island caused an accident in 1979. Behind this was the reflection that the situation was further disturbed by the reporters without solid knowledge of science & technology who sent out ambiguous information.

The outstanding characteristics of US education for science journalists, science writers, and science communicators are as follows.

1. As many as 45 universities in the US have established training courses (basically master's programs of one to one and half years).
2. The faculty consists of experienced science writers and science journalists (same as the UK) and the class centers on seminars. Internship is also given high priority.
3. Many graduates find their jobs at universities and public relations department of research institutes as well as various media (sometimes staff in charge of public relations are also called "science writers"),
4. Many universities have visiting professorship and fellowship programs for science journalists (science writers).

In terms of the third point, there are situations where universities that are granted preferential tax treatments have a duty to emphasize publicity activities and they need activities for acquiring talented students and researchers and research funds. In addition, there are the National Association of Science Writers (a similar association is also existent in the UK) composed of science writers in a broad sense (science journalists, publicity staff, non-fiction writer in science and technology fields) and the Council for the Advancement of Science Writing that support the National Association.

In US universities, regardless of arts or natural science major, liberal arts education in science for undergraduates is given high priority and, in many cases, the instructors have a high level of science communication ability.

Another characteristic of the US is that private foundations are trying hard to support universities and activities for enhancing understanding. In particular, the activities of Sloan Foundation, which support the publication of science books for the general public and production of plays on scientists and TV programs on science education, are noteworthy.

(3) Japanese situation and challenges

In Japanese universities, there are no courses for training journalists, not to mention those for training science journalists/writers. (Under this situation, the science journalist "juku" sponsored by the Japanese Association of Science & Technology Journalists is noteworthy.) Although there are various discussions as to merits and demerits of this situation, training of science communicators with technical skills is indispensable particularly for activating science communication. Science communicators here include following professionals:

- ○ Staff in charge of science & technology publicity in universities, research institutes, enterprises, and organizations
- ○ Science journalists for newspapers, magazines, TV, and radio
- ○ Producers of TV/ radio science programs
- ○ Editors of science books/magazines
- ○ Specialized science writers who write science books/articles
- ○ Science writers serving concurrently as science & technology researchers who write science books/articles and make lectures
- ○ Staff of science museums
- ○ Teachers in natural science
- ○ Volunteers for enhancing understanding on science & technology

If competent professionals make due contributions in their fields, science communication should automatically be activated and science literacy of the general public is expected to improve. To train such professionals, establishment of specialized training courses is by any means necessary.

For establishing such specialized courses, professional colleges should be the most appropriate as they have a high level of expertise and can be flexible in terms of duration of programs and number of credits required. It is desirable that, taking into account the fact that the contents of education should center on seminars as in the UK and US, the faculty consists of instructors of various background including science writers/communicators with abundant practical experiences.

In addition, it is desirable that (1) various mass media, (2) public relations departments of universities and research institutes, and (3) educational facilities such as science museums prepare institutional settings for actively accepting personnel with specialized knowledge and skills. Based on the above consideration, we would like to draw following proposals.

1. Regardless of majors (science or art), more emphasis should be put on liberal arts education for improving science literacy of college students.

2. Science communication courses aiming at improving science communication skill of graduate students of natural science major should be established.

3. Professional graduate schools should be established aiming at training science communication experts.

4. The faculty of such graduate schools should consist of experts of science communication with abundant experiences, the curriculum should center on lectures and seminars, and internship should be introduced.

5. To prepare the places where science communicators can make full use of their expertise: more specifically, the mass media should make arrangements for accepting personnel with specialized education, various organizations such as universities, research institutes, enterprises, government agencies, organizations should establish science technology publicity offices, and science museums should actively employ those educated personnel.

6. Publication of science books/magazines and production of science programs should be subsidized.

7. Support for science communication activities (activities for enhancing understanding) by private foundations should be encouraged.

8. An organization for promoting science communication, like the British Association for the Advancement of Science, should be established.

9. Science Writer Association or Science Communicator Association should be established.

Figure 5 shows the above-stated idea conceptually.

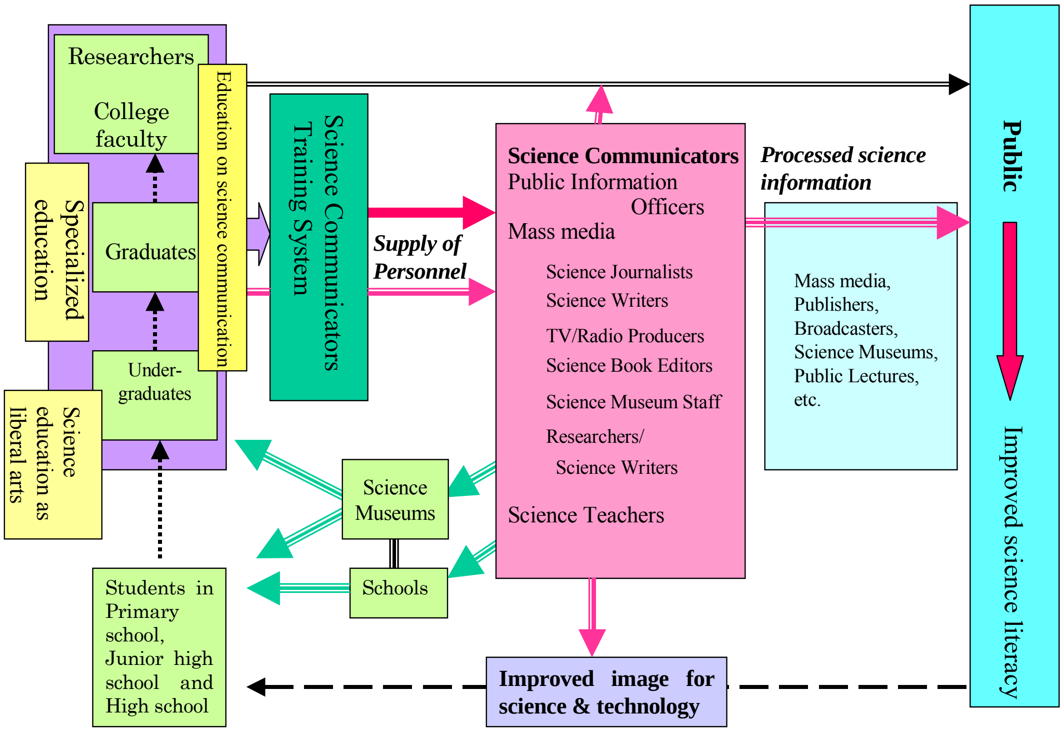

Figure 5: Conceptual figure on activation of science communication

Improved understanding and awareness of the general public towards science & technology can be expected through researchers with science communication skill conducting communication on their own and, at the same time, experts on science communication (science communicators) with specialized skill.

5. Issues to be examined

As part of the survey on elaborating the specific establishment plan of a science communicator training course, a personnel demand survey is scheduled to be conducted, which serves for finding out the image of a science communicator expected by various media and science & technology public relations departments. In addition, specific programs for supporting science communication activities and relevant personnel training are to be examined.