3.2.1 Science communication: An overview of policy development and academic research

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Abstract

In Japan, communication activities on the theme of science, technology, and innovation, and mainly targeting non-specialists, have been advanced through policies under the name of "science (technology) communication" for over a decade. This paper provides an overview of the development of such policies and outlines the academic research behind their formation.

Keywords

Science communication; science, technology and innovation policy; promoting understanding; public engagement

1 Introduction

The term "science communication" encompasses a wide range of activities. Even a cursory glance at the papers and articles published in the Journal of Science Communication and the Japanese Journal of Science Communication, open-access journals on science communication considered to have a wide readership from researchers to practitioners, as well as the survey reports archived by the Japan Science and Technology Agency (JST), reveals a variety of activities covering diverse subjects. Science communication is a scientific public relations activity in which scientists and scientific research institutions take the

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initiative in communicating the content, results, and significance of their research to the outside world. Science education is conducted in settings such as schools, science museums, and other museums. Science reporting and journalism are communicated through the mass media. Science communication involves a dialog between experts and non-experts on the impact of, and concerns about, scientific and technological research and development on society at large. Science communication is a cross-disciplinary—or to use a misleading term, "miscellaneous"—field encompassing the various activities mentioned above. Those engaged in these activities—be they policy practitioners or academic researchers—often have very different understandings of what should be central to the philosophy and practice of science communication and the value systems upon which they rely (Lamberts, 2017). Learning about science communication can be understood as learning about diversity and differences in the positions and views of the people involved in science communication.

As a first step toward such learning, this paper presents an overview of how science communication has been developed at the policy level in Europe and Japan. As mentioned, the activities encompassed by the term "science communication" and the intentions and objectives of those involved are diverse, and "interpretations" of why and how its policy development has been pursued have also been discussed in various ways. This paper presents literature compiled in English-speaking countries and Japan for practitioners and researchers involved in science communication, with particular emphasis on a number of introductory books on science communication published since 2000 (e.g., Bowater and Yeoman, 2012; Kaji Masanori et al., 2009; Shinichi Kobayashi et al., 2007; Fujigaki Yuko and Hirono Yoshiyuki , 2008), which are widely shared among those involved in science communication practice and research. Although this paper provides a very brief summary due to limited space, I hope that it will serve as a good starting point for advancing our understanding of science communication.

In this paper, Sections 2 and 3 first introduce the most basic policy developments in science communication in Europe and Japan, while Section 4 introduces some of the science communication research that has been conducted in parallel with these policy developments.

2 Science communication policy development in Europe

Science communication policies and measures in the UK and other European countries over the past two to three decades can generally be interpreted as shifting their focus away from "improving public understanding and attitudes toward science" (PUS) to "public engagement with science and technology" (PEST). This shift can be summarized as follows. In 1985, the Royal Society published a report entitled "The Public Understanding of Science," which sparked the issue of the general public's distrust and dissatisfaction with science and reflected their lack of support for it. People's lack of knowledge about science was identified as the cause of the problem. This led to the promotion of science communication activities to fill in the gaps in knowledge and solve problems by promoting awareness and education activities to promote the dissemination of scientific understanding from scientists to citizens. However, throughout the 1990s, it became increasingly clear that PUS-oriented science communication based on this kind of "information-deficit model" did not work as expected. In 2000, the House of Lords Committee on

Science and Society issued a report entitled “Science and Society” (House of Lords, 2000), which highlighted the limitations of the one-way science communication-focused PUS approach. It also mentioned the need to promote science communication in terms of the broader promotion of “public involvement with science and technology” (PEST), including participation in science policymaking, through two-way communication between experts and non-experts. Since then, while PUS-focused science communication has continued, institutional development—such as policy and budget allocations—have moved forward by implementing science communication through dialog, deliberation, and public participation with a strong awareness of PEST. Sciencewise and the National Co-ordinating Centre for Public Engagement (NCCPE) have also been established.

One of the main topics of recent science communication in Europe has been the positioning of Responsible Research and Innovation (RRI) as one of the key axes in Horizon 2020, the European Union’s strategic research and innovation program for 2014–2020. It clearly states the need for PEST to involve citizens in decision-making in innovation research and development and policy formation (European Commission).

3 Science communication policy development in Japan

It was not until the early 2000s that the term “science (technology) communication” came into widespread use in Japanese science and technology policymaking, and the country’s policy development, including budget allocation, began. The changes in the science communication concept and science communication initiatives in Europe described in Section 2 have served as references throughout the course of science communication design in Japan. A report entitled “On the Promotion of Understanding of Science and Technology and Science Communication” (Watanabe Masataka and Kan Imai, 2003), which was prepared as a research document by the National Institute of Science and Technology Policy (NISTEP) of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), and “Fun Relationships Between Science and Technology and Society: Café Scientifique (UK Edition)” (Kobayashi Shinichi et al., 2004), which was prepared by the Technology and Society Research Center of the National Institute of Advanced Industrial Science and Technology (AIST), set out the limitations of the unidirectional science communication established as a goal of PUS, and pointed to the need for interactive communication that furthers the scientific community’s understanding of society. The 2004 MEXT white paper, “2004 Science and Technology White Paper: The Future of Science and Technology and Society,” presented a direction for promoting this kind of science communication as part of science and technology policy.

In the Science and Technology Basic Plan, which is positioned at the top of Japan’s science and technology research and development policies, the scope of science communication and its significance have gradually been expanded from the first plan (1996–2000) to the current fifth plan (2016–2020), as shown in the shift from setting an agenda of “promotion of learning, understanding, and interest in science and technology,” to the use of phrases like “two-way communication between science and technology and society,” “science and technology for society and science and technology in society,” “responsible

approaches to ethical, legal, and social issues," "policies created and advanced together with society," and "dialog and collaboration with various stakeholders in society."

Typical examples of specific policy-level initiatives include the science communication talent development programs at Hokkaido University, Tokyo University, and Waseda University, implemented using the Framework for Developing Human Resources in New Fields within the MEXT Special Coordination Funds for Promoting Science and Technology (FY2005–2009) (Tsuzuki Akiko and Suzuki Mariko, 2009). Other projects include RISTEX (officially, Research Institute of Science and Technology for Society), established for the research and development of "social technology," that is, "technology for creating new social systems by integrating knowledge from multiple domains within the natural sciences and the humanities/social sciences." Moreover, SciREX (officially, Science for RE-designing Science and Technology Policy; SciREX website) includes projects like the theoretical and practical exploration of participatory science communication reflecting the voices of diverse stakeholders, including citizens, in science, technology, and innovation policy formation.

4 Academic research on science communication

As noted, the locus of science communication policy development has shifted away from improving people's understanding of science and technology (PUS) to promoting their active participation in decision-making about science and technology (PEST). An important factor influencing this policy transition is the buildup of academic knowledge.

Research using positivist and quantitative methods has been used to as policy evidence in the promotion of PUS-centric science communication policy, including studies which assume that people hold a static stock of scientific knowledge and attempt to determine that quantity of scientific knowledge by analyzing responses to questionnaires and tests consisting of questions about science (Bauer et al., 2007). In contrast to this positivist view, a series of studies that took people's understanding of science as something that is dynamically constructed and explored it in an interpretive manner came to prominence from around 1990 as key studies in science communication. These studies proposed that, depending on the context in which they need information about science, people dynamically construct their knowledge of science and their relationship with science by intricately connecting to factors outside of their knowledge-based—including their own experiences, values, and identities. In doing so, these studies sought to reinterpret people's understanding of science in a way that could not be captured using positivist methods. Studies using this interpretivist approach—with Wynn (1992) often referred to as a particularly representative example—gave rise to the "information-deficit model" critical framework, which pointed out the limitations of PUS-centric science communication policy development. This is seen as a milestone in the policy shift to PEST.

Since the beginning of the 2000s, when science communication policy development began to adopt the PEST framework, researchers interested in public participation in the formation of science, technology, and innovation policies have conducted a number of studies to address the question of how democratic public participation, guided by the theory and philosophy of PEST science communication, can be made possible, while engaging in the design and implementation of actual practical mechanisms for doing so. In recent

years, a number of articles and essays reflecting on such practices and research have been published (e.g., the special issue of the academic journal, Public Understanding of Science, "Public Engagement in Science vol. 23, 2014"). The question of how to identify the expertise necessary for governance when implementing science, technology, and innovation policy governance has been examined and discussed from political, economic, and social perspectives; see, for example, the series of discussions in the academic journal, Social Studies of Science, which began with Collins and Evans (2002).

There are many examples of public participation in science and technology policy decision-making in Japan. For instance, strongly related to the current academic discussion of science communication in Japan, "consensus conferences" have been conducted since the late 1990s by Wakamatsu Yukio (2010) and Kobayashi Tadashi (2004). These initiatives seek to "summarize citizen's assessments of, and recommendations for, science and technology through dialog between experts and citizens on specific, socially contentious science and technology" (ibid., p. 2). Another example is the "deliberative discussion caravan" led by researchers at Osaka University, which attempts to "gather diverse opinions from diverse people about new science and technology rather than to make policy proposals, propose an agenda—questions to be discussed in society—for future research and development, policy making, and practical application, and sow the seeds of social discussion" (Yamanouchi Yasunori, 2011, p. 3).

5 Conclusion

This paper has set out some of the policy developments in science communication in Europe and Japan, together with some related academic research. As stated at the outset, this paper presents only a very small part of the policies and research that make up science communication, and does not provide a sufficient overview of the whole picture. Nonetheless, I hope that interested readers will use the references provided in this paper and the materials listed in the bibliography to expand their own understanding.

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Relevant data and source

Journals

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- Science and Technology Communication
- Public Understanding of Science
- Social Studies of Science

Website

- Sciencewise
- National Co-ordinating Centre for Public Engagement
- RISTEX: Research Institute of Science and Technology for Society, Japan Science and Technology Agency
- SciREX: Science for RE-designing Science, Technology and Innovation Policy
- Japan Science and Technology Agency: Deepening Dialog and Collaboration with Society to Co-create the Future (formerly the Center for Science Communication)
- Japan Science Communication Association
- The Science Communication Society of Japan (voluntary organization)

Information on related courses, research projects, and courses

- STiPS Osaka University, “Introduction to science and technology communication A" (1 credit, Spring semester)
- STiPS Osaka University, “Introduction to science and technology communication B” (1 credit, Summer and Winter semesters)

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