

## REQUIRED SKILLS AND TRAINING PROGRAM FOR SCIENCE COMMUNICATORS

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### Abstract

National Museum of Emerging Science and Innovation (Miraikan) carried out the interview surveys to the organizations with a strong awareness of the importance of science communication activities, to clarify the definition of science communicators required in society. Based on that, Miraikan, as an educational institute for science communicators, established the training programs for science communicators for internal and external personnel. A part of these programs has already operated, which revealed some problems to be solved for the improvement of the training system.

**Keywords:** Science communicator, Communication, Training program, Skill, Career path

### 1. Introduction

Modern societies enjoy the great benefit of science and technology, however, on the other hand, the advancement of research and technology makes it difficult for people to understand those technologies, which sometimes brings anxiety or problems for science and technology to the society. This suggests the importance of information sharing in the society so that people can make proactive and reasonable decisions on science and technology.

Japanese Government emphasizes this point, and recognizes the creation of occasions for information sharing and communication for science and technology and the training for human resources contributing to those activities as science communicators as one of the most important policies for science and technology. Also, the researchers are encouraged to participate in outreach activities to inform the society the objectives and significance of their research in an understandable way, as well as to have abilities for these activities. Under such circumstances, several universities have launched the training courses for science communicators, and science museums are making efforts to provide more science communication activities to the society.

This paper introduces the activities by Miraikan, as an educational institution, especially the training programs for science communicators, including some findings from its trial operations.

### 2. About Miraikan

National Museum of Emerging Science and Innovation (Miraikan) was established in 2001, with the concept of 'The museum as a place accessible to everyone and where science and technology are perceived as a part of culture, their role in society and future possibilities are pondered, and ideas are shared'. Since then, Miraikan has been playing an important role in PUR activities. Miraikan aims not only to explain science and technology in an easy-to-understand manner and gathers information on innovative research activities, but also to become a catalyst creating a new awareness of the value of science and technology through the establishment of a network linking Miraikan with eight groups shown in Fig. 1.

At the same time, Miraikan has a role as an educational institute for science communicators. Miraikan has two types of profession as science communicators, one is 'Science and Technology Specialist' who designs and develop science exhibitions and events, and another is 'Interpreter' who explains the science exhibitions. They have been trained on their science communication abilities by engaging in the activities Miraikan provides as their job. Some of them are participating in the activities outside Miraikan, and have already left Miraikan to be active as professional science communicators. Thus, those abilities obtained through the experiences at Miraikan are increasingly exploited in society.

However, the achieved level of their science communication abilities varies because of a wide range of their specialties and tasks. This suggests that the current training method highly depending on internal job exercises does not always provide adequate opportunities to all of them in terms of effective training of science communicators. In order to develop sufficient abilities as science communicators in society, it is necessary to establish a systematic training program.

We therefore investigated socially desired skills and quality for science communicators to define the ideal science communicator, and attempted to clarify the relationship between skills to be learned and tasks in Miraikan, and then the levels to be achieved for these skills. Based on the result, we have established the training program to cultivate science communicators to meet social requirements by utilizing science communication environment in Miraikan.

This training program was designed for internal personnel of Miraikan as premises for produce science communicators with high quality though, we are prepared to offer a part of this program to external personnel in prospect of producing a wider range of science communicators and promoting the mobilization of human resources (see Fig. 2).



Fig. 1 Network linking Miraikan with 8 groups

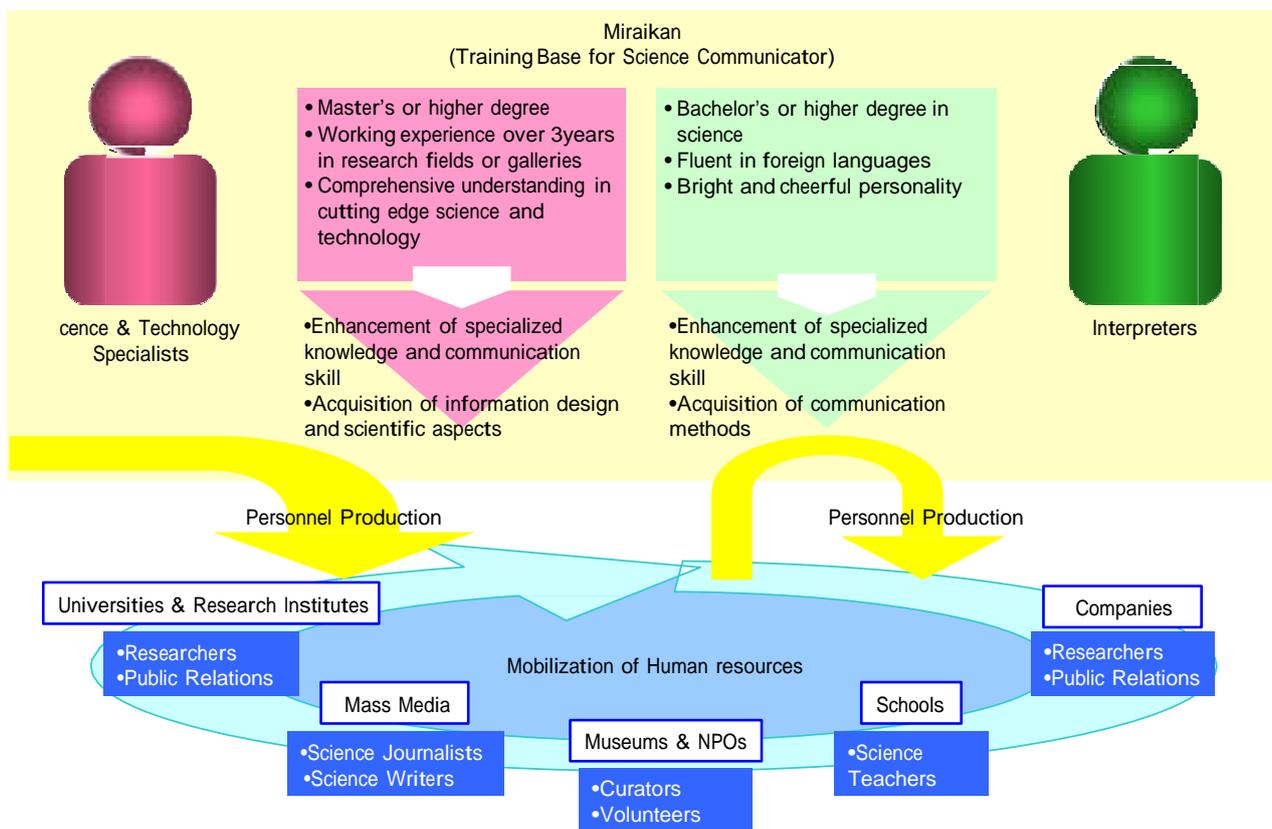


Fig.2 Miraikan as a training base for science communicators

### **3. Required Skills for Science Communicators in Society**

The investigation to establish the training system for science communicators to meet social requirements was carried out by two methods as below;

#### 1) Interview surveys

Interview surveys were carried out in order to figure out the desired skills in science communication practices. Eleven universities with special programs to cultivate science communicators and research institutes with strong awareness of the importance of science communication activities in Japan were extracted, and the leaders of these activities were interviewed during October and November 2005.

#### 2) Participation in symposiums and conferences

We have participated in seven symposium, conferences and workshops through March to December 2005, to understand the social and political issues concerning the environment surrounding science communicators and to study the examples of science communication activities and training practices for science communicators around the world.

As a result of these surveys, we defined science communicators to be desired in society as those who can deliver the messages between researchers and society. We also identified that three skills are necessary for science communicators as follows;

#### 1) Research and information coordination skill

- To explore cutting edge research with specialized knowledge of science and technology and information design,
- To understand social problems and controversies brought by science and technology, and
- To recognize and analyze information comprehensively and objectively.

#### 2) Presentation and communication skill

- To promote interactive communication,
- To provide information by various communication methods, and
- To write documents such as papers, articles and proposals.

#### 3) Management skill

- To plan, organize and evaluate science events and exhibits, and
- To take the leadership of the project or the team to perform the activities.

However, it also became clear that no institutes had any standard for the achieved levels of these skills. Furthermore, this survey revealed that there are few actual opportunities nor systematic programs to practice science communication even though it is considered to be essential for the training of science communicators.

### **4. Training Program for Science Communicators at Miraikan**

The results from the surveys brought us the definition of the target science communicators to be cultivated at Miraikan as those who should be able to;

- promote interactive communication between scientists and lay people,
- arrange opportunities and personnel network for science communication, and
- introduce alternative idea and scientific information to society.

Based on the definition above, the training program for science communicators was established focusing on the acquisition of the three skills introduced above. The program was designed as the combination of practices of science communication activities at Miraikan and complementary lectures in consideration of obtaining wider range of knowledge and experience.

#### **4.1 Training Program for Internal Personnel**

As mentioned above, Miraikan has two types of profession as science communicators, Science and Technology Specialists and Interpreters. Our training program aims to cultivate and provide them to society as science communicators with all three required skills at excellent level to be able to perform science communication activities not only in Miraikan but also in society.

We segmentalized those three skills and organized existing activities for science communicators at Miraikan by skill to find the correlation between skills and jobs as shown in Fig. 3.

Fig. 3 shows that the practical activities in Miraikan include some elements other than socially required skills, such as customer service and exhibition management, which are not exactly science communication activities but essential for a museum. It also reveals that some of required skills, such as using of media and journalism, cannot be learned adequately from practical activities at Miraikan.

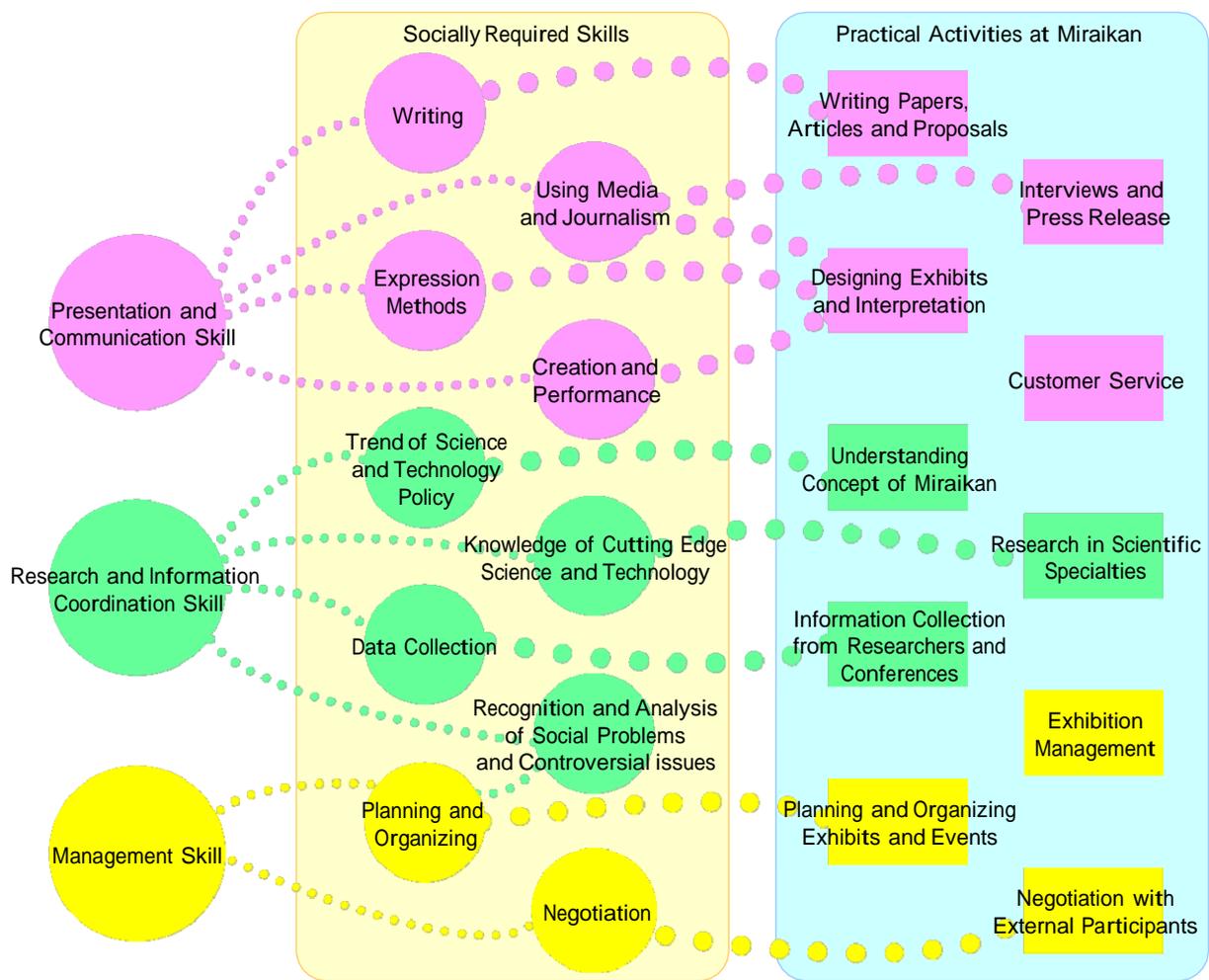


Fig. 3 Correlation between required skills as science communicators and practical activities in Miraikan

Therefore, we classified required skills into two categories, skills to be acquired through practical activities (on the job training) and to be learned by lectures as described in Fig. 4.

As for the performance measure of skills to be acquired by practical activities, Fig. 5 describes the achievement levels set according to the role or positioning in the activities, and tasks to be performed in each level and skill are identified.

These levels are also applied for the skills to be learned by lectures. Lectures cover topics including basic and advanced knowledge to perform science communication activities as well as workshops to understand and discuss on the social issues concerning science and technology. External experts are invited as lecturers for some topics, and internal staff also may give some lectures when they have specialties for specific topics, which can be an training opportunity and a chance to share their knowledge and know-how. These lectures are provided through the year, and they can choose lectures to take individually according to their necessities.

Miraikan gives a certification of 'Miraikan Science Communication Expert' to the internal personnel who achieve high level for all skills as science communicators through this training program, with authorization by the committee including external experts.

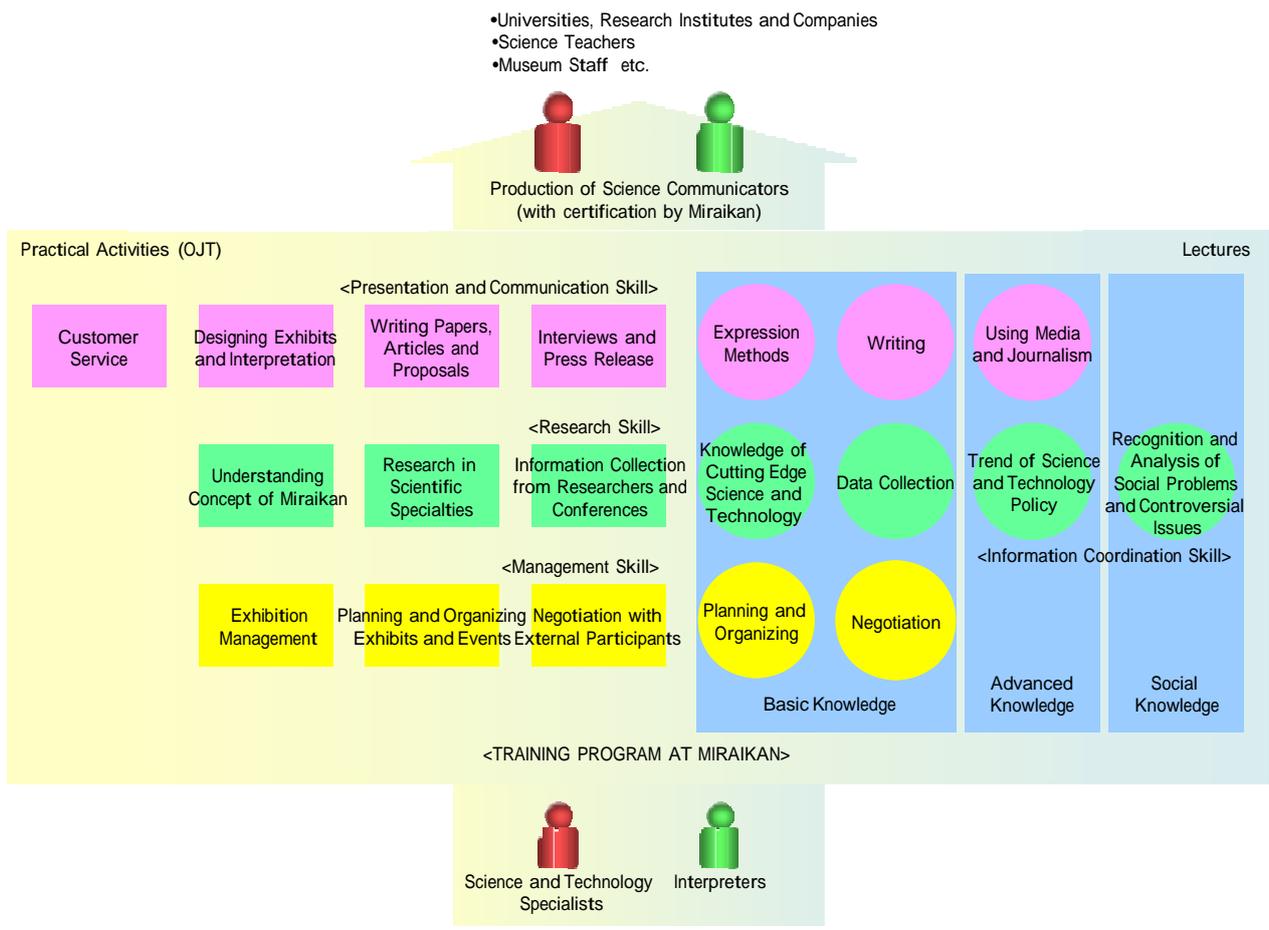


Fig. 4 Framework of training program for science communicators at Miraikan

Achievement	Mandatory Training		Performance in Practical Activities		
	Entry Level		Middle Level		High Level
	Level 1	Level 2	Level 3	Level 4	Level 5
Performance and Leadership	Discovering and solving problems in assigned tasks		Creating and developing new tasks		
	Working under supervision	Leading assigned tasks	Leading internal projects	Leading outside projects	
Teaching Junior Colleagues			Recognized by and influence in society		
			Teaching junior colleagues		

Fig. 5 Performance measure of skills for science communicators at Miraikan

**4.2 Training Program for External Personnel**

As we established the training program for internal science communicators at Miraikan, a part of this program, such as practical activities using exhibition facilities and lectures, is reorganized as the training program for external personnel pursuing their science communication abilities. This training program focuses on the training of research and information coordination skill and presentation and communication skill, aiming to train people who are involved in science and technology, such as researchers and personnel engaged in public relations in universities, research institutes and companies, postgraduate students, science teachers at junior high and high schools, curators at museums. And two training programs are prepared, a short-term training and a long-term training.

A short-term training program is designed for small groups with three to ten people to consider the science communication methods and their effects for one week. The program consists of research and discussion on controversial issues concerning science and technology, and presentation exercise using exhibition facilities. Those who finish the program receive a course completion certificate.

A long-term training program is designed for three or four people taking them in Miraikan to participate in science communication activities as assistant staff and practice their own specific subjects for one year. They also take lectures for internal staff described above. Miraikan gives a certification of 'Miraikan Science Communication Associate' to those who finish the program.

## **5. Discussions**

Some part of the training programs, such as lectures for internal staff and a short-term training program for external personnel, has already been operated on trial basis prior to the official launch in April 2006. As a result, several issues to be considered further have been found as follows;

### **5.1 Evaluation method for the quality and effectiveness of science communication activities**

Concerning the training of internal science communicators, the achievement level is assessed simply by completing the tasks and lectures assigned for each skill and level, however, it is necessary to objectively evaluate the quality of the performance of their activities and the understanding of lectures in order to truly assess their achievements. In particular, the assessment of the exhibits and events in terms of the quality of science communication, the current criteria such as self-evaluation and the number of visitors may not give appropriate evaluation. Although the evaluation method for the performance of museums is still under the establishment so that the comprehensive evaluation of the quality and effectiveness of activities by museums is even more difficult issue, it is essential to establish the framework of evaluation such as criteria and evaluators to ensure the reliability of the training programs and the abilities of science communicators.

### **5.2 Implementation System of Training Programs for External Personnel**

The internal science communicators with higher skills are required to be participate in the training program for external personnel as lecturers and trainers. These staff are often engaged in important roles for the internal tasks as leaders. It is predicted that we would have to accept many external personnel such as postgraduate students in the training program over the busy season of summer and winter holidays of Miraikan, which makes the coordination of internal staff difficult to operate the training programs without causing any trouble in the usual museum operation. Miraikan, as an educational institute for science communicators, is willing to accept and train as many trainees as possible from outside, however, it is inevitable to have constraints for the number of acceptable trainees and the training period, which suggests that it is imperative to produce an adequate number of internal science communicators with excellent skills.

### **5.3 Public Acknowledgement and Utilization of Certifications**

Miraikan has established the certification system for science communicators, which is not simply an evidence of finishing the training program but assures to society their quality as science communicators with required skills at excellent level. Therefore, this certification would be recognized its value as it is acknowledged and used in society. It is important to disseminate and spread the certification system, in order to create an social environment for the certified science communicators to be able to conduct their activities extensively, as well as to produce excellent science communicators. This would stimulate the motivation for both science communicators and society using them. Also, it is expected that the network of certified science communicators is developed to activate the information exchange and sharing on science communication activities and to promote the mobility of human resources in science communication. Miraikan is willing to become a bases of such a network.

## **6. Conclusion**

The training system will be run in parallel with consideration of above issues, and any necessary improvement will be made for more effective system. Furthermore, some social issues need to be pointed out as below to realize an environment for successful science communication;

### **6.1 Financial Support for Trainees from Remote Locations**

The external trainees are required to attend Miraikan during the period of training program to experience practical science communication activities. This often causes financial burden for the trainees from remote locations, which may be an impediment to participate in this training program. This is a common problem for both trainees and organizations providing training opportunities. It is necessary to develop some kind of financial support scheme especially for students including a possibility of introducing a public support from a perspective of social and educational system.

## **6.2 Diversification of Career Path for Science Communicators**

It is important to establish a variety of career path for science communicators as a premise to produce trained science communicators and to promote the mobilization of human resources. However, the opportunities to become a science communicator for a vocation are extremely limited at the moment, even though the awareness of necessity for science communicators is increasing. This is a serious issue requiring the change in social consciousness, and Miraikan is prepared to be proactive in tackling with this issue.

It is important for trained professional science communicators to have sufficient opportunities to perform their science communication specialties, as well as for those already engaged in research fields to improve their communication ability and expand their activities. This is a key to establish a creative and competitive environment with the diversity of science and technology, where science and technology is appropriately evaluated and utilized.