

A New Concept of the Science Museum in the 5G Museum as The Participatory Museum

Reiji Takayasu (Fukuoka City Science Museum Science Communication Expert)

Introduction

For a long period of time in Japan, educational activities in museums were regarded as “activities of interpreting the objects”. Therefore, those who were interested in exhibitions and the educational programs at Science Museums were the dilettantes (fanciers), the minority of the public. Especially after the Great East Japan Earthquake in the year 2011, it has been realized that the scientists do not have all the answers in the complex situation where multiple elements are combined. So it is necessary for the citizens to take Science Literacy from that tragedy. Since the late 2000’s, the idea of “the Science Literacy for Japanese” was advocated as a guideline.

It means that people should be able to make use of what they learned at museums back in their society. In addition to that, the requirement upon the museums transferred from just the recreation to learning which can be returned to the society. A new concept of education in science museums has come to be sought.

Background: Today's situation in Japan

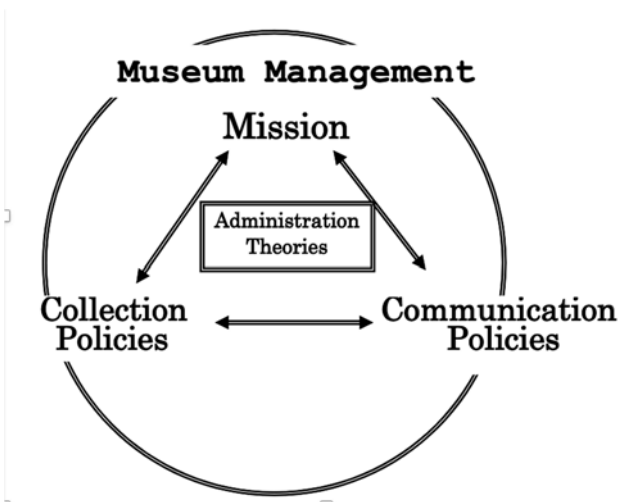
The role of museums in society is expected to have broader effects not only in education, but in science museums in particular, the need to answer social issues with scientific education is expected. Especially in the Natural History Museum, the usefulness in the region and the world is more strictly demanded. The reason is that it is necessary to respond to the involvement in natural environment protection and to the changing science and technology, not only to inform "the value of museum materials" but also to show the usefulness of scientific diversity and social effects.

(1) Social Function of the Museum

In Japan, the three functions of the museum today are the following "mission", "collection" and “communication.” (From the handout of the special project of the Japan Museum Management Academy by Dr. Peter van Mensch of Reinwardt Academy and Dr. Eilean Hooper-Greenhill of Leicester University, etc.) Among these, the collection function includes Research function, and learning activities are included in the communication function. There are two major types of research activities and learning activities in science museums.

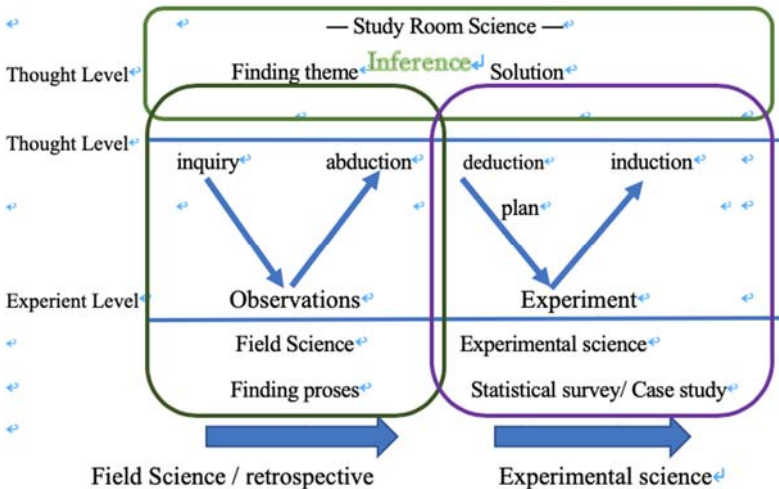
(2) Three types of problem-solving models in science museums

Fig.1 Function of Museum Management



Scientific activities in museums are divided into two approaches; field scientific and experimental exploration. These activities are composed from the scientific inferences which are deduction, induction and abduction. For example, if we want to make participatory programs, we can use abduction inference. Abduction inference connects to Design Thinking.

Fig.2 Science research W-shape methods



It was found that the significance of incorporating design thinking into the method of educational spread activities in the science museum is to make use of the features of design thinking while making use of common points. The “series of learning”, which is composed of themes of discovery and setting, and learning methods based on the consumer or the learner itself, is referred to as “learning program based on design thinking” and is described using the following four keywords:

- 1) Person's point of view: Human-centred sensuous ideation, setting the task (age, interest, sociality, etc.) according to the person and the necessity of literacy that can construct the process by oneself.
- 2) Science point of view: The attitude of facing information critically what and how to learn, the necessity of problem finding by reasoning (abduction) of field science based on experimental science.
- 3) Future perspective: The need for future insights and concepts through the integration of inference (abduction) and design idea development and prototyping
- 4) Viewpoint of social realization: Necessity of using public funds and business model to implement future insights in the real society.

By incorporating the above four perspectives into various learning programs, it is possible to respect learning activities based on museum materials and to work on a wide range of themes that have relationships with society. In addition, science museums are considered to contribute to the position as a social hub to create social innovation by considering complex social issues.

It was suggested that the learning program could be a means to bring about innovation of science itself as well as commentary on science. The development of a learning program that will be "expansive learning" that can cope with the future society will be the core of future science museum activities.

A new trial of Fukuoka City Science Museum (proposal)

The Fukuoka City Science Museum is a science museum set up not by the Board of Education but

by the "Child Future Bureau" in the fifth largest city in Japan. There are approximately 1.5 million users in the first year, and it is estimated that their uses are diverse. The basic exhibition room and the planning exhibition room carry out " Science and Creative activities", and have a video hall with a function of the planetarium, a large multifunctional hall, a library, a scientific information search room, an open space for infants and there is also a learning space for junior and senior high school students. As a result, it has a large number of users. In other words, it has various functions such as books, welfare facilities for children and seniors, and learning spaces for junior and high school students, unlike pure science museums as before.

This museum has two new managing concepts that aim at enabling learners to help themselves-develop and encouraging Public Engagement. The policies of this museum's management are self-development in museum programs and public engagement for museum activities. Therefore, "six promises" are shown as a policy of the Science Museum administration.

Table 1 The Management Policy of Fukuoka City Science Museum (2017)

- 1)By interacting with people and creators who are responsible for science, we will propose a new way of science communication.
- 2)By fulfilling exhibits and programs that meet the needs of infants and the elderly, we will create a science museum where everyone can enjoy and create science.
- 3)By providing opportunities for children to develop their curiosity, doubts, thinking skills and creativity, we are able to extend the power of science for each individual.
- 4)By developing collaborative programs in science with diverse citizens, scientists, teachers, and parents, we contribute to creating an environment in which children can grow in society.
- 5)By utilizing various resources such as Fukuoka people, goods, and events, we will support the activities of citizens to design and disseminate the region and its future with a scientific perspective.
- 6)By promoting dialogue and exchanges with users, we will strive to improve facilities and businesses and aim to become a science museum that evolves every day.

So, activities of public involvement are the most important for self-development at the museum as the 5G Museum (ver.2) under the 5G information age.

Science Museums and Innovations

Today we address innovative ways for science-technology and natural history museums to present effective activity through recent permanent, temporary, mobile exhibitions, and educational programs.

(1) The Participatory Museum

According to Roger Hearts, there are eight stages at the stage of participation in citizen activities centered on children, and the mission given as "non-participation (manipulated activities)" up to the third stage. It should aim at the form of four or more stages of activity to do by understanding oneself. At that time, as a learner-centered activity, you should aim for a "child participation project" that matches the achievement purpose while using interactive and interaction type activities. The following

can be considered as a concrete method of activity.

Table 2 New rolls of Science Museums

1) Design of child's growth

The purpose is for children to visit the Science Museum, create a collaborative program of science with schools (especially elementary and junior high schools) and homes, and also with scientists, etc., enjoy science, be impressed by science, achieve using science We take measures to support scientific power to children through feeling. Ex. Action research: Research to understand and improve social situations such as favorite places and dislike places in town

2) Design of culture

Science museums, zoos, botanical gardens, aquariums, museums, art museums, etc. together create culture, and there is a need for their existence as a means of fostering humanity, and there is a necessity for collaboration with the science museum. The same meaning as "exchange and collaboration between people and people" is in "exchange and collaboration between museums and museums", and this makes it possible to work differently from a single museum. Furthermore, we will make efforts with an eye to the enhancement of citizen's human power and Fukuoka City's culture and creativity, including cooperation and collaboration with various groups.

3) Regional design

The existence of creators in Fukuoka is large, and collaboration with the creative industry is essential. Also, relying on that collaboration, using a creative lab, children and citizens will support their growth from a mere user's point of view as a "creator" who has acquired creativity and design thinking. Furthermore, by discovering and using various people, goods, things such as various things other than creators, we support activities that citizen designs area and the future independently. For that purpose, even if it is a small result, since it is necessary for the result to be transmitted to citizens and society and rooted in them, we will actively work on information dissemination of them.

4) Design of new sprout of science

Collaboration between scientists and creators embraces the new possibilities of science and design. Science museum should play the role of the adhesive.

5) Universal society design

The Science Museum aims to be a universal museum. This not only has great benefits for people with disabilities, but it also changes the consciousness of healthy people (eg, re-recognition of the five senses). And, by spreading the various experiences accumulated in them to the society, regardless of differences in age, gender, disability, culture, etc., everyone supports each other as a member of the local community and extends the power that each one can possess Support the creation of a socially capable society.

(2) Examples of Participatory Activity

1) The Jigsaw Reading Method

2) Curriculum of Super General Science

Conclusions:

These results provide new insight to our understanding for new roles of science museums. In addition to the traditional role to fostering citizens' scientific literacy, creating opportunity for citizens to help themselves-develop and encouraging Public Engagement can be a new role of science museums.

Furthermore, this type of learning can be improved by marketing through the existing database system, for example, matching needs and market segmentation for potential participants. These “innovation” of program designing and information providing can be the key for future educational activities in

science museum.