Space Ark (宇宙箱舟) workshop and the Archimedean point

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Thanks to: E. Mizumachi, T. Shiose, Y. Douno, M. Kamitani, H. Kurokawa, N. Mori, H. Makizawa, Noti's, and all other facilitators and participants.

EASE2016, 2016 Aug 27, Tokyo

Artists image, Pale Red Dot

I am…

✓ an astrophysicists,

1992/01/12

 ✓ enthusiastic about collaborations with humanities scholars, such as philosophers, anthropologists, and historians,

✓ and a lover of science communication.



木村大治 大村敬一



"Space Ark" workshop

What kinds of living things will you take when you emigrate to other stars?



• Developed in 2011 by a team of scientists, school teachers and students.

Ref: Development of Hands-on Activities for Teaching biodiversity and cultural diversity: "Space Ark Workshop" Mizumachi, Isobe, Kamitani, Kurokawa, Shiose, Douno and Mori 2013, JAXA-RR-12-007



- Thinking and talking about space emigration liberate us from daily assumptions and prejudices and lead us to various new questions.
- This is one form of scientific mind-sets, isn't it?

Purpose of Space Ark WS

- Participants of the workshop will:
 - learn new scientific knowledge
 - find the trans-science nature of science: "uncertainty" and "questions without right answer"
 - relativize their value and commonsense and obtain different viewpoints

* Different kinds of learning depending of the age and character of the participants.

Outline of a typical case (1/2)

* Case for elementary school level

Preparation : divide into groups. 4 ~ 6 participants for each.

- Ice-breaking while setting up the kit
- ① Introduction: rule and concept
- 2 Work 1 : Each group select 12 kinds of living things to load the ark
 - The selection criteria are determined by the group
- ③ Prsentation 1 : Each group presents the selected living things and the reasons
 - By listening presentations of other groups, participants find various viewpoints of selection (as food, pet, fermentation etc.) as well as the interaction of living things such as food chain.
- ④ Work 2 : Re-selection of the living things
- 5 Let's sail to the new world!
 - ···Oops some cockroaches strayed into the ark. Do you kick out them or take them with you? (Work 3)







Outline of a typical case (2/2)

- 6 Accident!
 - Pick up an accident card and follow the instruction
 - Depending on the participants response the facilitator explains the meaning of bio diversity etc.
- Work 4 : Imagine you are one of the living things in the ark and explain how you feel now.
- ⑧ Work 5 : Arrival to the new world! Think up the menu for diner
 - Ingredients are of course…
- 9 Presentation 2 : Each group present their menu
- 10 Summary

The heater is out of order! Plants with red marks are gone.

The gravity controller is out of order! Large animals are gone.

Space animal protectors abduct all the small animals!



- Move on to the second part in the case more time is available.
- In the second part participants think of "what things (materials, tools etc.)" or "what experts (medical doctor, carpenter etc.) " they take.

Some interesting outcome

Earthworm full course

A group could take only earthworms except for plants bacteria. They invented variety of wonderful cuisine using earthworm.

In "things" version, one group

select tools survive in primitive circumstances, while the other considered knowledge is the most important and hence bring electric books.

Primitive or knowledge?

Adaptation? Evolution

One pupil asked: "will giraffes eat meats is there's no grasses?"

Survival is not the only goal

In a WS at a temple, a group of old ladies select animals "with whom they wish to go to heaven"

Problem

- There are some cases in which the children play the workshop like a "game" in which living things are "selected" the human or "killed" by accidents.
- For those who naively know "good things" such as "protecting environment" and "bio-diversity", it make sense to shake their "common sense".
- However, for those who do not share such "common sense", "relativizing the widely-accepted value" may end up with unintended result.
- What are the pros and cons of "scientific mind-set"?

Hannah Arendt

Hannah Arendt (1906-1975)

Author of "The Origins of Totalitarianism" and "The Human Condition"

According to Arendt, acquisition of the "Archimedean point", started by the Galileo's telescope and completed by Sputnik and Apollo, namely the viewpoint far outside the Earth, was the fundamental reason of the triumph of the modern science, but at the same time it may threaten the human condition.





The Archimedian point



"Give me a place to stand on, and I can move the earth."



"The blue marble" taken by Apollo 17

Pros and cons of the Archimedean point

- "If we look down from this (Archimedean) point upon what is going on on earth and upon various activities of men, that is, if we apply the Archimedean point to ourselves, then these activities will indeed appear to ourselves as no more than "overt behavior" which we can study with the same methods we use to study the behavior of rats" (H. Arendt "The Conquest of Space and the Stature of Man"
- Arendt warned that the view from the Archimedean point relativize the life and human activities and considered them as mere phenomena described by the law of nature.
- Arendt's discussion was focused on nuclear, automation and space technologies, but if she lives today she would be interested in genetic engineering, geo-engineering, artificial intelligence etc.



Modern way of thinking, such as science, has much more degree of freedom compared with traditional ones. Therefore it has vast possibility, as well as risks.

Science and religion are the two windows to see the world - Freeman Dyson



"I do not believe that we are tourists in our universe. I do not believe that the universe is mindless… We are not merely spectators; we are actors in the drama of the universe." – Freeman Dyson

How can we foster the "scientific mind-set" and other complementary concepts?



Pale Blue Dot, from Voyger1, NASA

Summary and discussion

- We have carried out the WS more than several tens of times at schools, museums and public evens.
- Quality and contents of learning heavily depends on the facilitator.
- In order to be used by teachers in the classroom, ready-made manual is necessary.