

Dissemination of Basic Knowledge on Nuclear Power in the Citizenship Education Program

1. Reason and Purpose of the Research

According to the public opinion surveys carried out by newspaper agencies including Asahi, Yomiuri and Mainichi during the Lower House election in 2017, the “nuclear power policy” ranked as one of the priority policies for eligible voters when choosing which political party to vote for. On the other hand, another survey, made by Japan Atomic Energy Relations Organization in 2016, showed that people’s amount of knowledge on nuclear power was considerably low. The fact that people have just a limited knowledge of nuclear power, despite its significance as a policy, gave me a sense of crisis. Particularly, after the accident of Fukushima Daiichi Nuclear Power Station in 2011, people have started to have a negative image toward nuclear power generation and often liken it to something “scary” or “dangerous.” Through this, I thought that providing knowledge on nuclear power would be able to help people make decisions more confidently, which should promote a more proactive discussion on the usage of nuclear power.

My idea is to provide basic knowledge on nuclear power to high school students, who are going to be granted voting rights in the near future, in the scheme of “citizenship education” which has been receiving attention in line with the expansion of voting rights to citizens aged 18 and older. In the beginning, I was concerned that it might affect the neutrality of the citizenship program if nuclear power policies were featured. In that respect, the previous research says that having a large amount of knowledge on nuclear power does not always make the person support the use of nuclear energy. Therefore, I concluded that my idea would not affect the neutrality of the citizenship education.

This research was aimed at examining the possibility of featuring nuclear power policies within the citizenship education program. Since the outcomes include a specific class plan for citizenship education that requires neutrality, my own opinion on the usage of nuclear power remained undisclosed through the research.

2. Method of Research

1) I visited the following key persons to gain a deeper understanding of nuclear power.

- Kansai Electric Power Co., Inc. Oi Nuclear Power Plant
- Takeshi Hisano, Honorary Professor of Kwansei Gakuin University

- Akira Yamaguchi, Professor of Nuclear Professional School, The University of Tokyo (at the symposium organized by Japan Atomic Energy Relations Organization)

2) Questionnaire survey of the 1st and 2nd- year students of Toyonaka Senior High School to understand their amount of knowledge on nuclear power.

3) Visit to organizations that promote the knowledge on nuclear power and compare their activities with that of the citizenship education.

4) Visit to NPO “Mielka,” that provides citizenship education (Doshisha University, Imadegawa Campus)

5) Prepare a specific class plan for the citizenship education program and examine the possibility of disseminating the knowledge on nuclear power within the program.

6) Submit the final class plan to the Toyonaka Senior High School.

3. Results and Consideration

1. School questionnaire survey

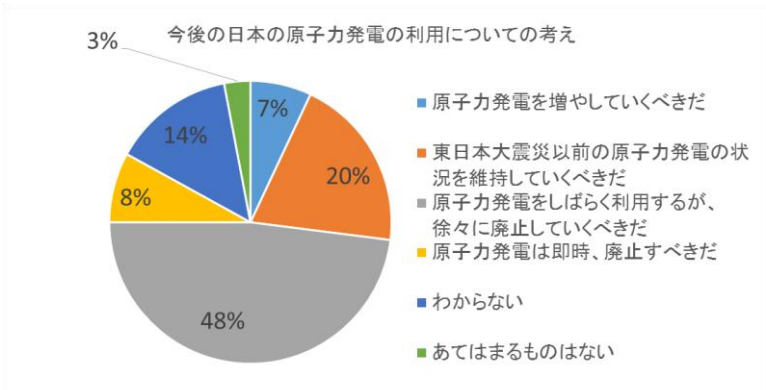
Two questions were asked in the survey: one for the future use of nuclear power and the other to gauge respondents' knowledge on nuclear power. A subjective knowledge amount was adopted here as the previous research proved that an objective knowledge amount can be predicted from the subjective one. Questions were made with reference to the “public opinion poll on the use of nuclear power 2015” made by Japan Atomic Energy Relations Organization that used a subjective knowledge amount. The respondent amount was 759 students (1st & 2nd year of Toyonaka Senior High School). Questions and results are as below. (Results for Q2 have been chosen).

Q1. What do you think about the future use of nuclear power generation? Please circle the answer which most closely matches your opinion.

1. Nuclear power generation should be increased.
2. The situation prior to the Tohoku Earthquake should be maintained.
3. Nuclear power generation should be abandoned on a gradual basis.
4. Nuclear power generation should be abandoned immediately.
5. I'm not sure.
6. N/A

【図】 The future use of Japan’s nuclear power generation

Nuclear power generation should be increased.
The situation prior to the Tohoku Earthquake should be maintained.
Nuclear power generation should be abandoned on a gradual basis.
Nuclear power generation should be abandoned immediately.
I’m not sure.
N/A



Q.2 How much do you know about the following issues on nuclear power and energy? Please choose 1-4 that most closely matches your knowledge.

1. I know very well. 2. I know a little bit. 3. I have heard of it. 4. I do not know.

1. Japan’s energy self-efficiency ratio is 6%.
2. Carbon dioxide is one of greenhouse gases that leads to global warming.
3. A variety of power generation methods are being used to make the electricity supply more stable.
4. Nuclear electricity generation is produced by making steam from <u>uranium fission</u> and operating the turbine generators.
5. Thermal power generation is produced by making steam from <u>burning fossil fuel</u> and operating the turbine generators.
6. In France approximately 80% of total electricity output is generated by nuclear power generation.
7. In Germany they have adopted a policy to phase out the nuclear power generation.
8. The process in which uranium and plutonium are extracted from spent nuclear fuels and used as fuel is called “nuclear fuel cycle.”
9. The light-water reactor fuel includes 3-5% of uranium, which is more likely to undergo fission, while atomic bombs are made of almost 100% uranium.
10. We are constantly subjected to natural radiation from the universe, the earth,

the air as well as foods.
11. Radiation and radioactivity are different things.
12. Radiation is being used for medical, industrial or agricultural purposes.
13. Currently approximately 1% of all electricity is generated by nuclear power generation.

【左の図】

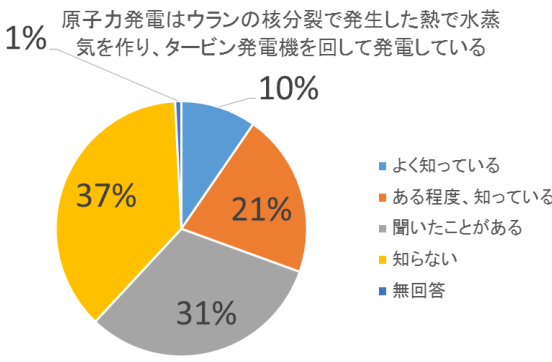
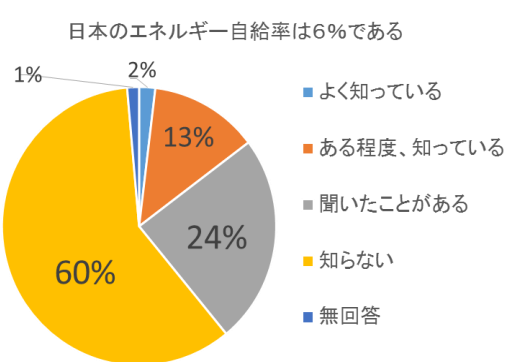
Japan's energy self-efficiency ratio is 6%

1. I know very well.
2. I know a little bit.
3. I have heard of it.
4. I do not know.
5. No response.

【右の図】

Nuclear electricity generation is produced by making steam from uranium fission and operating the turbine generators.

1. I know very well.
2. I know a little bit.
3. I have heard of it.
4. I do not know.
5. No response.



【左の図】

The light-water reactor fuel includes 3-5% of uranium, which is more likely to undergo fission, while atomic bomb are made of almost 100% uranium.

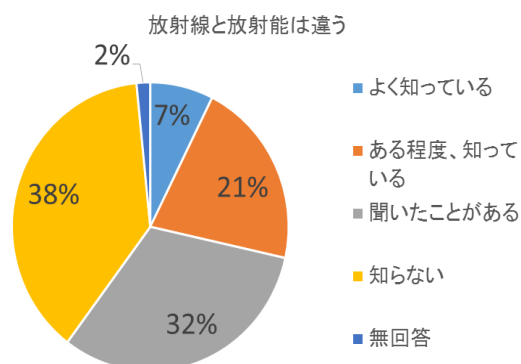
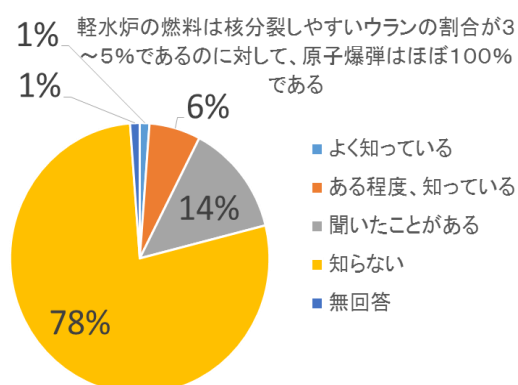
1. I know very well.
2. I know a little bit.
3. I have heard of it..
4. I do not know.

5. No response.

【右の図】

Radiation and radioactivity are different things.

1. I know very well.
2. I know a little bit.
3. I have heard of it.
4. I do not know.
5. No response.



【円グラフ】

Students' amount of knowledge on nuclear power

High

Zero

Low

Middle

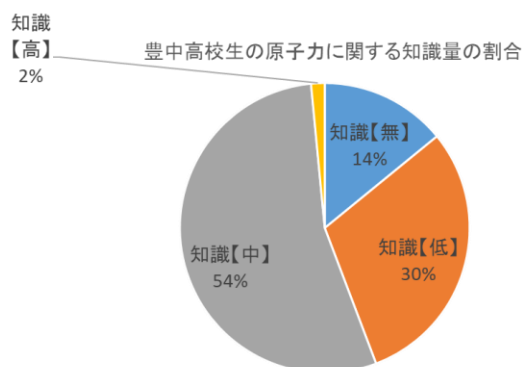
【右の表】

High 10-13 items

Middle 3-9 items

Low 1-2 items

Zero 0 item



	「よく知っている」「知っている」を選んだ合計
知識が高い層	10～13個
知識が中程度の層	3～9個
知識が低い層	1～2個
知識が無い層	0個

Reviews

The survey found that while more than 80% of Toyonaka High School students have their own opinions on the use of nuclear power, many do not have sufficient knowledge for considering the use of nuclear power, as illustrated by the answers for “Japan’s energy self-sufficiency rate,” “mechanism of nuclear power generation,” “difference of atomic bomb and nuclear power” and “difference of radiation and radioactivity.” The fact that they have their own opinions should be highly evaluated. However, the students who have a high amount of knowledge on nuclear power were much fewer. Without the basic knowledge, they might make decisions just considering their surface-level idea for “nuclear power.”

Unfortunately, the nuclear power policy is something that requires long-term perspectives. Without reliable knowledge or serious consideration, their opinions might become more susceptible to negative perspective. That means that they become more vulnerable to trends in the media and information from the government. In the end, this might affect the significance of the election system that should reflect people’s opinions. As a result, I recognized the stronger necessity of educating people about the knowledge on nuclear power or energy issues in citizenship education.

Next, to examine the effectiveness of educating about nuclear power in the citizenship education program, I attended a symposium organized by the Japan Atomic Energy Relations Organization and conducted the same questionnaire survey to the attendees.

2. Results of questionnaire survey at the symposium

To examine the effectiveness of using the citizenship education program, I attended the symposium organized by the Japan Atomic Energy Relations Organization on Dec 16, 2017 and conducted the same questionnaire survey to the attendants. The results are as below.

Symposium attendees’ amount of knowledge

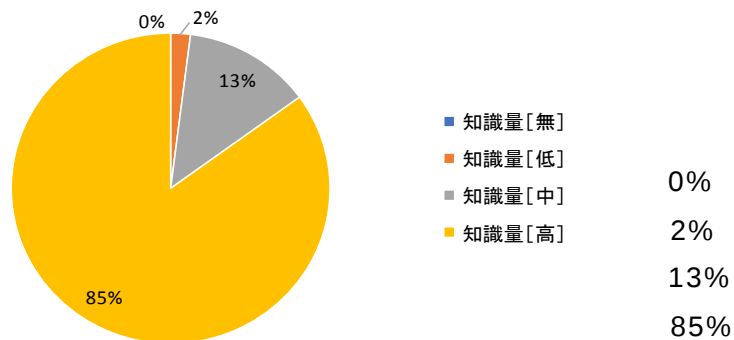
Zero 0%

Low 2%

Middle 13%

High 85%

シンポジウム参加者の知識量



Reviews

The result showed that the symposium attendees had a considerably higher amount of knowledge. I assume that is mainly because people who attend symposium on nuclear power issues are more likely to have higher interests in nuclear power. Therefore, I concluded that the idea of spreading the basic knowledge on nuclear power in the citizenship education makes more sense rather than organizing a similar symposium on our own.

3. Visit to NPO “Mielka”

I visited NPO “Mielka,” that offers the citizenship education program, to gain insights about the importance of the citizenship education program and the points to consider in preparing a specific class plan.

4. Preparing a class plan

With the insights from Mielka and other materials, I prepared a class plan (50min x 2). I had my plan checked by Mielka and revised it many times. Notably, I added a debate time to the plan as they emphasized the importance of the process in which students reach to their own opinions rather than decision making itself. The final class plan is as below.

Citizenship Education Program Plan ver 1.3 (50min x 2)			
Title	Contents	What to accomplish	Duration
1 st session			
Introduction	-Hearing of the students' current images of nuclear power -Share the people's negative image of nuclear power after the Fukushima accident (with public opinion data) -Share the purpose of this class, that is to provide an opportunity to consider	Stimulate students' interests on this theme. Make them understand that young people need to give serious thought to these issues.	10min

	nuclear power and energy issues and the fact that these issues are ongoing.		
Explanation	The mechanism of electric generation. Introduce power generation methods - Nuclear power (produce nuclear waste, not CO2) and the difference between radio activity and radiation - Thermal power/Water power - Renewable energy (wind, solar) (merits/demerits) Share the social aspect of the nuclear power issue. Examine the merits/demerits of nuclear power (1 for each)	Provide basic knowledge Help them understand that these issues need to be rethought now.	15min
Discussion	Make groups of 4 persons and share the merits/demerits (NOTE: they do not clarify their own positions) Presentation of the merits/demerits in the class (Staff type in the PowerPoint on the screen)		15min
Debate preparation	Separate one group into 2 supporters and 2 opponents. Choose 2 merits or demerits as above and prepare the debate session by reinforcing their side (introduce the Resource Energy Agency's website so that they can collect data that supports their opinions.)	Inform the students about websites that have reliable data to backup their opinions.	10min
2 nd session			
Debate	Start the debate session. (1st opinion by supporter team >> discussion, 1st opinion by opponent team >> pro team rethink their opinion, 2nd opinion by supporter team >> anti team rethink their opinion, 2nd opinion by opponent team >> supporter team's summary >> opponent team's summary	Provide more objective viewpoint that allows them to examine their own opinions. Help them understand the difficulty of making decisions without reliable knowledge to refer to.	30min
Summary	When the debate is successfully finished,	Help them understand the importance of gaining sufficient	10min

	tell the students about the importance of considering the merits and demerits on their own. If the debate could not be successfully completed, tell them about the difficulty of expressing their own opinion without substantial amount of knowledge. In the end, share the purpose of this class again.	knowledge so that they can make decisions appropriately for the election, etc.	
Questionnaire	Conduct a questionnaire survey	Have the students provide reviews about this program.	10min

Focal points

- To help them understand the fact that nuclear power policy is an issue that every single person of all ages need to give serious thought.
- To provide basic knowledge on nuclear power, mainly focusing on the items that achieved low recognition rates in the school questionnaire survey.
- To introduce the official websites which they can refer to when they need to gain knowledge especially after they are granted voting rights.
- To implement a debate session as an exercise to review their own opinions from a more objective perspective.

4. Summery and Plans

This research was aimed at examining the possibility of disseminating basic knowledge on nuclear power in the citizenship education program. First, from the previous studies, I found it possible and sensible to educate the basic knowledge on nuclear power in the citizenship education program. Next I prepared a specific class plan so that I can test how much effect it can have on raising the students' amount of knowledge on nuclear power. My goal was to implement the plan in the citizenship program, which has not happened so far. I would like to continue my efforts so that I can implement the class plan in the citizenship program in the near future.

5. Reference

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