

## A study on the Secondary School Teacher's Perception Change for Nuclear Power through an Experiment Practice Program

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### 1. Introduction

Recently, nuclear application fields have been enlarged continuously in order to improve quality of life keeping a close relationship with life style of people [1].

General public is not familiar with nuclear power because they have difficulties in acquiring accurate and unbiased information on nuclear power, and they are exposed to critical media against nuclear power. In order to solve this problem, correct and objective information should be provided to general public [2]. It is important to correct mis-understanding perception of general public for nuclear power for development of nuclear industry and the nation's advancement [3]. It is required to provide secondary school students and teachers with correct information by learning activities in addition to mass media and textbook. If teachers have wrong concept, students are affected by the negative impact. Therefore, teachers should understand nuclear power correctly [4].

KAERI(Korea Atomic Energy Research Institute) has served an education program entitled 'to understand nuclear power correctly by experiment and practice' as an practice and improvement program for the secondary school teachers. We checked the change of the secondary teacher's recognition for nuclear power by the survey.

Table I: Curriculum

Type	Title	Hour
Lectures	Understanding the nuclear power and radiation (Basic)	2
	Nuclear power system simulation	2
	Communication with nuclear	1
	Nuclear energy policy in Korea	1
Practice	Measuring and training of environmental radiation	2
	Practice on nuclear simulator	1.5
	Practice on radiation detection	1.5
Field trip	Radioisotope (Visiting RI facilities)	2
	Visit to nuclear organization	3

### 2. Methods and Data

#### 2.1 The education program

In this study, we have operated the secondary school teacher's training program for basic information on nuclear energy. The curriculum is composed of four lectures of six hours, three practices of five hours and two facilities visit of five hours. The education curriculum is shown in Table I. The education program was operated for secondary school teachers at KAERI for three days from August 2<sup>nd</sup> to 4<sup>th</sup> in 2016.

40 participants answered all questionnaires. The participants are composed of 19 men (47.5%) and 21 women (52.5%). There are 1 man in his 20s, 7 people in their 30s, 13 in 40s, and 19 people aged over 50s. 8 people (20%) came from metropolitan area, 6 people (15%) from Kangwon Province, 11 people (27.5%) came Chungcheong province, 13 people (32.5%) from Gyeongsang Province and 2 (5 %) people from Jeolla Province.

Table II: Perception Survey Items

No.	Content
1	I am interested in energy problems. (Interest 1)
2	I am interested in nuclear power plants. ( Interest 2)
3	I am interested in environmental protection. (Interest 3)
4	Nuclear is inexpensive compared with other power resources. (Economic)
5	Nuclear power generation is helpful to protect the environment. (Environment)
6	The usage of radiation is helpful in our life. (availability)
7	We need nuclear to overcome the future energy crisis. (Need)
8	The nuclear power plants can be managed safely. (Safety)
9	Radiation is dangerous regardless of its amount. (Risk 1)
10	Living in nearby nuclear waste disposal site is not safe. (Risk 2)
11	Korea has outstanding technical skill for nuclear power generation. (Confidence 1)
12	Korea's nuclear companies are reliable. (Confidence 2)
13	Korea's policies of nuclear are reliable. (Confidence 3)
14	I can get a radiation therapy for health. (Acceptance 1)
15	I agree with additional constructions of nuclear power plants in Korea. (Acceptance 2)
16	I agree with constructions of nuclear power plants in the area where I live. (Acceptance 3)

Table III: Knowledge Survey Items

No.	Content
1	The nucleus of an atom is composed of protons and neutrons.
2	Marie Curie, Einstein and Fermi are scientist who won the Nobel prize in the nuclear field.
3	Nuclear fission energy is produced when neutrons collide with nucleus like the uranium.
4	Radiation is a flow of energy emitted from the unstable atoms or nucleus.
5	Sv as well as mSv is a unit showing the effect of radiation on the human body.
6	Intensity of Radioactivity increases over time.
7	We are exposed to natural radiation everyday.
8	All radiation can penetrate lead or iron.
9	Radiation exposure can be reduced by the distance from radioactive material, short time exposure and shielding material.
10	There is no international standard for the radiation exposure upper limit acceptable to protect the body from radiation.
11	The reactor of nuclear power plants is similar to the boiler of fossil fuel power plants.
12	Nuclear power plant produces green energy.
13	Nuclear power plant can reduce electricity price.
14	Nuclear power plants cover about 30% of the total electricity in our country.
15	Spent fuel can be recycled for future energy resources.
16	Nuclear power plants have a safety design concept with multiple protection mechanism.
17	Reactor in nuclear power plant stop when an accident happens.
18	Radioactive waste can be discharged from hospital, factories and industries.

Table IV: Course Process Assessment Survey Items

No.	Content
1	I participated at this program with a high expectation.
2	I am satisfied with the program overall.
3	Classes were appropriately programed to meet their purposes.
4	The program schedule was proper.
5	The contents were properly composed for comprehension
6	The program provided a new skill and knowledge.
7	The contents are valued in our organization.
8	The program satisfied my expectation.
9	I will recommend this program to others.
10	I am satisfied with the facility of class room.
11	I am satisfied with the lecturers.

## 2.2 Methods and Contents

The questionnaire of awareness and knowledge change were conducted before and after the education process. The questionnaire of course process assessment was conducted after the education process.

Level of each item on the survey ranged from 1 for very negative statements to 5 for the positive statements. The contents for the questions of awareness, knowledge, and course process assessment are listed on Table II, III and IV.

## 3. Results

### 3.1 The Analysis of the Perception Evaluation

The survey items of perception level for nuclear power are composed of economic feasibility, availability, safety and interest.

According to the survey, the environment friendliness level was increased by 0.78 (15.6%) from 2.78 to 3.55, availability level was increased by 0.52 (10.4%) from 3.88 to 4.4, safety level was increased by 0.75 (15%) from 3.23 to 3.98, dangerousness level was increased by 0.9 (18%) from 2.33 to 3.23, reliability level was increased by 0.5 (10%) from 3.6 to 4.1, acceptance level was increased 0.63 (12.6%) from 2.55 to 3.18. When comparing pre-assessment and post-assessment scores for the whole group, the average pre-assessment level was 3.5, and the average post-assessment level was 3.89. The survey showed the perception level went up 0.39 (8%). Nuclear perception change is shown in Fig. 1.

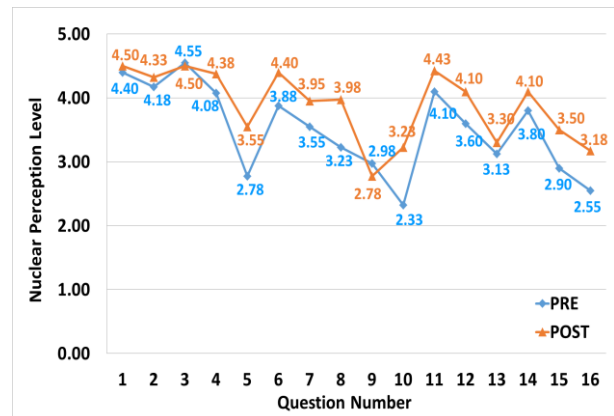


Fig. 1. Nuclear perception level change for the secondary school teachers

### 3.2 The Analysis of Knowledge Evaluation

The nuclear knowledge level was evaluated on the test for the basic nuclear concepts with 18 questions. Correct answers are increased by 15.7% from prior evaluation 74.86% to the follow-up evaluation 90.56%.

A lot of teachers answered incorrectly for difficult questions, no. 9 and 17, on the test. Radiation shield is described in the question no. 9, and nuclear power plant accident is described in no. 17. The survey showed that the nuclear knowledge level was increased by more than 15%. Nuclear knowledge change is shown in Fig. 2.

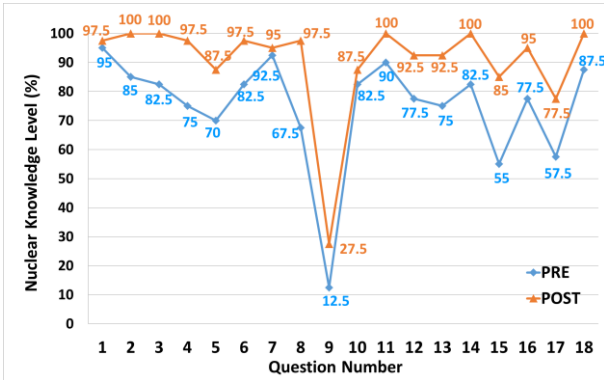


Fig. 2. Nuclear knowledge level change for the secondary school teachers

### 3.3 The Analysis of Course Process Evaluation

The questionnaire items of the course process evaluation included anticipation, satisfaction, and conformity for the education purpose and environment. The expectation level was 4.33, satisfaction level was 4.74 on the survey. The course process level is shown in Fig. 3.

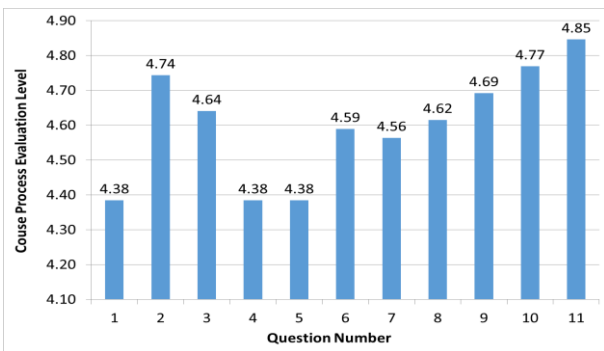


Fig. 3. Course process evaluation

## 4. Conclusions

In this study, we checked the change of the secondary school teacher's recognition level for nuclear power by the survey before and after the education program.

Nuclear Perception level was increased by 8% showing optimistic mind for the safety, dangerousness, and necessity of nuclear power plants after the education. Nuclear knowledge level also went up 15% through the education program.

It is concluded that the nuclear perception of the secondary school teachers can be improved through the education program for nuclear power. Secondary school students form general public in the future. Perception of the students is influenced by teachers deeply. Government should be continuously concerned with the nuclear education program for the secondary school teachers so that the teachers can make a key role to increase public acceptance for the nuclear power effectively.

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