

## Change in Knowledge of Korean Elementary, Middle, and High School Students in the Fundamental Education on the Nuclear Power Generation

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### 1. Introduction

If the Fukushima nuclear disaster in Japan is a sign of risk to nuclear safety, resulting in a philosophical respect on nuclear power generation safety, it may be inevitable that more fundamental doubts are raised about safety, which can cause tremendous social and economic damage [1]. Although in Japan, the country directly involved in the Fukushima nuclear disaster, research suggested nuclear power plants should be gradually reduced and eventually be discarded in the future. Nuclear power facilities and policies are based upon their acceptability to local residents and citizens. In Korea, where nuclear power should be consistently used for national energy security and economic growth, it is important to enhance the social acceptability of nuclear power [2]. To do so, it is necessary to relieve the minds of the Korean people and global nuclear power communities regarding safety. However, there is sharp division on the perception of nuclear power safety between the expert group of operators, philosophers, and regulators, and ordinary citizens, local residents, media, and anti-nuclear groups [3].

This study designed an experiment on knowledge change as part of an educational strategy to enhance public understanding and develop extensive bonds of sympathy for nuclear power generation adequate for Korean society. In order to provide fundamental evidence for planning an educational intervention strategy, this study analyzed the knowledge change of elementary, middle, and high school students, who are then expected to impact education of the general population.

### 2. Methods and Results

The research consisted of five steps. First was research design. In the process of designing the research, the subjects, method, content, and duration of the education, were determined. Second was sending official notifications and selecting final subjects, and then conducting a field trip. The third step was a pre-survey and step four was conducting education (45 minute-long theoretical video and lecture). Finally, the post-survey was completed. The education method included watching a video (10 minute long) and a lecture (25 minute long), which covered the principles, actual state, and current state of use of nuclear power

generation. In order to minimize the error due to a lecturer, one radiation expert was invited to conduct the education program for each class of subjects. The education was conducted from December 11 to 20, 2013. There were 82 male students (66.7%) and 41 female students (33.3%) participating in the research. There were 43 elementary school students (35.0%), 45 middle school students (36.65), and 35 high school students (28.5%). Cronbach's  $\alpha$  value prior to education was high for objective knowledge of 0.771. Cronbach's  $\alpha$  value after education was also high for objective knowledge of 0.737. SPSS/WIN 15.0 was used for checking mean  $\pm$ SD, t-test. For a posteriori testing, the Scheffe method was used. In order to determine scale credibility, Cronbach's  $\alpha$  was used.

#### 2.1 Change in Objective Knowledge Level based on Fundamental Education about Nuclear Power Generation

After offering basic information on nuclear power generation to Korean elementary, middle, and high school students for 45 minutes, we analyzed their change in objective knowledge. The basic knowledge level on five items was enhanced. The statement "the residents near nuclear power plants are more exposed to radiation than residents in other areas" showed the lowest level of knowledge before and after the education. The statement "the radiation exists everywhere" showed the highest knowledge level before and after the education. The reason students thought residents near nuclear power plants are more exposed to radiation is related to their negative perceptions.

#### 2.2 Change in objective knowledge level based on fundamental education about nuclear power generation per class

As a result of providing basic information on nuclear power generation to elementary, middle, and high school students, even a short lecture which lasted for 45 minutes significantly raised the objective knowledge level. In particular, the knowledge level of high school students was highest both before and after the education. Even short one-time education on basic knowledge about nuclear power improved knowledge levels about nuclear power generation.

Table 1. Change in Objective Knowledge Level of the Fundamental Education regarding the Nuclear Power Generation

Item	n	Before education	After education
		Mean± SD	Mean± SD
1. Nuclear power generation is a way of generating energy.	123	0.76±0.43	0.85±0.35
2. Korea currently operates nuclear power plants.	123	0.63±0.48	0.82±0.38
3. America, Canada, France, and Germany use nuclear power generation.	123	0.44±0.50	0.85±0.35
3. Radiation exists everywhere including places with sunlight, playgrounds, classrooms, etc.-	123	0.85±0.36	0.93±0.26
4. The residents living near the nuclear power plants are more exposed to the radiation than other residents.	123	0.37±0.49	0.59±0.49
Total	123	3.06±1.64	4.05±1.32

Table 2. Change in Objective Knowledge Level regarding the Fundamental Education on Nuclear Power Generation per Class

Section		n	Mean± SD	t(p)
Elementary school students	Before education	43	2.37±1.80	-4.475
	After education	43	3.26±1.72	(.000)
Middle school students	Before education	45	3.38±1.51	-5.429
	After education	45	4.47±0.92	(.000)
High school students	Before education	35	3.49±1.34	-4.970
	After education	35	4.51±0.56	(.000)

### 3. Conclusions

As a result of conducting a 45 minute-long education on the principles, state of use, advantages, and disadvantages of nuclear power generation for Korean elementary, middle, and high school students, the levels of objective knowledge ( $p < 0.000$ ) was significantly higher. This indicates that if education for enhancing social acceptance in Korea argued nuclear power should be constantly used, an education effect could be anticipated. Although objective knowledge does not have any direct influence on behavior change, it is an important variable for attitude change, and thus information on objective knowledge should be offered as well. Here, the contents preferred by the education subjects should also be considered. The effect of the message is enhanced when various formats of information are offered [4]. According to So et al (2011), danger perception may actually differ even with the same content depending on the genre of the TV program [5].

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