Effects of Safety Education on Nuclear Power Among Students in Korean Elementary, Middle, and High Schools According to Gender

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1. Introduction

In South Korea, a distrust of society and government has surfaced regarding the hazards associated with nuclear power generation and the general usage of radiation. In turn, this has provoked an overall feeling of anxiety among the public, which has even been reflected in a recent policy making decision on nuclear power. Adults tend to cause confusion in terms of policy making decisions because their perception is unlikely to change. Future generations however, should be encouraged to make rational decisions by themselves. To establish such an intervention strategy, this study analyzes the effects of education on nuclear safety among elementary, middle, and high school students.

2. Methods and Results

Nuclear power and radiation safety education, including theoretical education and practical training, was provided for 2,645 students in Korean elementary, middle, and high schools between September and December 2016. The effects of this education were then analyzed. Moreover, survey data obtained from 1,404 (53.1 %) male students and 1,241 (46.9 %) female students were examined. The number of students who had never received nuclear power or radiation education was 1,966 (74.9 %), whereas the number of students who had previously received such education was 258 (9.8 %) – considerably lower than the former. In terms of the level of schools, 188 students (7.0 %) were enrolled in elementary schools, 1,209 (45.0 %) in middle schools, and 1,290 (48.0 %) in high schools. The lesson, including theoretical education on nuclear power generation and radiation safety, as well as a practical training session on measuring natural radiation, lasted for two hours.

1. Differences in the Effect of Education on the Intention of Participating in Nuclear Energy Policies According to Gender

With regard to students' intentions to participate in the vote on building nuclear power plants in Korea and in their home regions, a statistically insignificant difference was found both before and after the lesson. The result of conducting a mock vote indicated a statistically significant difference ($p<0.01$) regarding the establishment of nuclear power plants in Korea. Moreover, male students tended to agree with building nuclear power plants both before and after the lesson, whereas female students tended to oppose it. The result of casting a vote on building nuclear power plants in students' home regions shows a statistically significant difference ($p<0.01$), verifying the fact that a higher proportion of male students expressed agreement, while female students displayed an opposite view.

2. Differences in the Effect of Education According to Gender

The results of the analysis indicate that male students showed a statistically significant difference in terms of knowledge (i.e. nuclear power generation, medical radiation, and food irradiation), attitudes (i.e. necessity and safety), and actions related to the safety of nuclear power generation. In addition, the average values after the lesson were higher than those before education, implying that knowledge, attitudes, and actions can be changed through education. It was also found that female students showed a statistically significant difference in terms of knowledge (i.e. nuclear power generation, medical radiation, and food irradiation), and actions related to the safety of nuclear power generation, and that the average values after the lesson were higher than those before receiving education on the topic. This indicates that education can affect students' knowledge and actions. Yet, their attitudes towards the necessity of nuclear power generation, associated safety measures, and the use of radiation showed a statistically insignificant difference. Based on these results, it can be estimated that the attitudes of female students are unlikely to change through education.

3. Conclusions

Although general public anxiety surrounding nuclear power generation and the general usage of radiation has brought to light several issues regarding nuclear energy policies, very few strategies to solve these problems have been established. Therefore, various programs focused on knowledge, attitudes, and actions related to nuclear power generation and the usage of radiation should be provided to encourage future generations to use rational value judgments when considering nuclear power generation. Furthermore, given that the change in female students' attitudes as a result of education is limited, further studies on identifying the causes of such limitations should be carried out.

REFERENCES

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Table 1. Difference in the Effect of Education on Students' Intention of Participating in Nuclear Energy Policies

Question	Item	Before education		Total	(p)	After education		Total	(p)
		Male	Female			Male	Female		
Intention of participating in the vote on building nuclear power plant in Korea	Existent	1045 (52.5)	946 (47.5)	1991 (100.0)		1093 (52.6)	984 (47.4)	2077 (100.0)	
	Non-existent	355 (55.0)	291 (45.0)	646 (100.0)	1.192 (.275)	270 (52.4)	245 (47.6)	515 (100.0)	.006 (.936)
	Total	1400 (53.1)	1237 (46.9)	2637 (100.0)		1363 (52.6)	1229 (47.4)	2592 (100.0)	
Intention of participating in the vote on building a nuclear power plant in the home region	Existent	961 (52.0)	886 (48.0)	1847 (100.0)		1027 (52.9)	915 (47.1)	1942 (100.0)	
	Non-existent	440 (55.8)	349 (44.2)	789 (100.0)	3.100 (.078)	335 (51.8)	312 (48.2)	647 (100.0)	.238 (.626)
	Total	1401 (53.1)	1235 (46.9)	2636 (100.0)		1362 (52.6)	1227 (47.4)	2589 (100.0)	
Result of the vote on building a nuclear power plant in Korea	Agreement	632 (58.6)	447 (41.4)	1079 (100.0)		810 (56.3)	628 (43.7)	1438 (100.0)	
	Opposition	437 (46.3)	507 (53.7)	944 (100.0)	30.471 (.000)**	304 (45.8)	360 (54.2)	664 (100.0)	20.278 (.000)**
	Total	1069 (52.8)	954 (47.2)	2023 (100.0)		1114 (53.0)	988 (47.0)	2102 (100.0)	
Result of the vote on building a nuclear power plant in the home region	Agreement	194 (67.8)	92 (32.2)	286 (100.0)		435 (64.5)	239 (35.5)	674 (100.0)	
	Opposition	808 (49.4)	829 (50.6)	1637 (100.0)	33.294 (.000)**	626 (46.9)	710 (53.1)	1336 (100.0)	56.212 (.000)**
	Total	1002 (52.1)	921 (47.9)	1923 (100.0)		1061 (52.8)	949 (47.2)	2010 (100.0)	

Table 2. Difference in the Effect of Education According to Gender

	Item	Division	Male student		Female student	
			mean±s.d.	(p)	mean±s.d.	(p)
Knowledge	Nuclear power generation	Before education	2.88±1.41	-22.696	2.51±1.38	-27.771
		After education	3.72±1.20	(.000)**	3.58±1.24	(.000)**
	Medical radiation	Before education	2.57±1.66	-5.377	2.31±1.55	-8.219
		After education	2.80±1.46	(.000)**	2.68±1.42	(.000)**
	Irradiated food	Before education	1.27±1.56	-30.232	0.97±1.33	-28.196
		After education	2.80±1.72	(.000)**	2.50±1.81	(.000)**
	Safety knowledge	Before education	1.05±0.90	-16.473	1.01±0.89	-14.100
		After education	1.47±0.80	(.000)**	1.37±0.83	(.000)**
Attitude	Attitude to necessity	Before education	4.04±0.97	-6.186	3.91±0.85	0.119
		After education	4.22±0.90	(.000)**	3.91±0.88	(.906)
	Attitude to safety	Before education	3.54±1.17	-3.237	3.27±1.03	.000
		After education	3.66±1.15	(.001)**	3.27±1.03	(1.000)
Action for nuclear safety		Before education	0.55±0.80	-21.187	0.35±0.67	-20.698
		After education	1.12±0.94	(.000)**	0.91±0.94	(.000)**