

# Effectiveness of Scientific and Cultural Programs on Perception toward Nuclear Energy

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## 1. Introduction

The Korean government is actively establishing and promoting policies to raise citizens' level of understanding and knowledge of science and technology. Such programs are designed to develop a scientific and technological culture in which citizens demonstrate their creativeness and foster creativeness [1].

Thus, numerous Government-supported Research Institutes in the field of Science and Technology (GRIST) are currently operating scientific and cultural programs (SCPs). SCPs aim to promote science education and proliferate scientific culture among citizens. Studies show that programs such as SCPs have positive effects on enhancing public understanding and acceptance of science and technology [2]. Over 150 SCPs were operated by at least 13 GRIST located in Daedeok Innopolis over the past three years [3].

Korea Atomic Energy Research Institute (KAERI) also has been operating six different SCPs targeting both the student and adult audiences. Through these programs, KAERI provides education and activities on nuclear science by visiting schools, and communities or by inviting students or neighboring citizens to the research labs and facilities [4].

However, there has not been an intensive statistical study on the effectiveness of SCPs on citizens' perception in the field of nuclear science. Unlike other fields of science and technology, there is a sharp division of opinions between those who approve and disapprove of nuclear energy. Thus, this study intends to evaluate the effectiveness of KAERI SCPs on citizens' perception of nuclear energy. Then, this study will further analyze the difference among age groups and provide policy implications for the development of KAERI SCPs.

To evaluate the effectiveness of SPCs on perception toward nuclear energy and how to get them more involved, the following research hypotheses were constructed.

- H1** SCPs have positive effects on citizens' perceptions of nuclear energy.
- H2** Different age groups have been introduced from different sources.

## 2. Methods

First, this study will demonstrate whether KAERI SCPs were effective in enhancing citizens' perceptions of nuclear energy by using questionnaires of the most

recent KAERI SCPs in 2021 (n=257). If any positive correlation reveals, communication strategies suitable for different age groups will be further discussed.

### 2.1 Data Collection

Science Cultural Communication Team of KAERI surveyed 257 citizens who participated in KAERI SCPs which operated in 2021. Due to the spread of COVID-19, both 'contact' and 'noncontact' programs were carried out throughout the year. 'Contact' participants were surveyed face-to-face, and 'noncontact' participants were surveyed online.

For analytical reasons, questions that are not relevant were not used in this analysis. Survey questions from Q5-1 to Q6-2 were organized on a five points scale where 1 is the lowest and 5 is the highest point. The questions are shown in Table 1.

Table I: Survey Questions for SCP Participants

Survey No.	Survey Questions
Q1	Name of the program participating
Q2	Age group
Q3	Contact source of KAERI SCP
Q4	Purpose of participation
Q5-1	Contents
Q5-2	Management ability
Q5-3	Overall satisfaction
Q6-1	Perception before participation
Q6-2	Perception after participation
Q7	The most favorite KAERI's SCP

### 2.2 Quantitative Analysis

Survey respondents were asked about their level of perception toward nuclear energy both before and after participating in KAERI's SCP (survey questions Q6-1 and Q6-2). To analyze the effectiveness of the SCPs, paired-sample t-test verification was performed. Next, a chi-squared test was performed to determine whether diverse age groups have obtained information on the SCPs from different sources.

## 3. Results

### 2.1 Effectiveness of KAERI SCPs (H1)

To test for H1, a paired-sample t-test verification was used. The results of the analysis show that the average perception before participation (survey question Q6-1) was 3.52 and the average perception after participation

(survey question Q6-2) was 4.33. Furthermore, both mean values had statistically significant effects before and after the program ( $p < .001$ ). This result can also be seen in Fig. 1., where the post-test scores are higher than the pre-test.

As a result, this shows that KAERI SCPs have a positive impact on participants' opinions of nuclear energy.

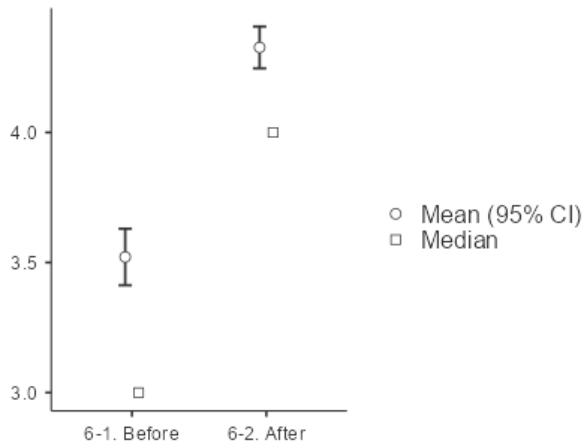


Fig. 1. Paired-sample T-test Verification Results

## 2.2. Different Sources between Age Groups (H2)

Although KAERI SCPs were found to have positive effects on participants' perception toward nuclear energy, the contact source of programs varied among different age groups; Adults (ages 20 and over) and minors (ages under 20).

Therefore, chi-squared analysis was further taken to derive policy implications. Using Q3 from Table 1, the contact sources were coded into P1 family, P2 friends, P3 KAERI SNS, P4 KAERI website, P5 media (newspaper and TV), P6 online community, P7 school, and P8 others.

Table 2: Chi-squared Test Results

	P1	P2	P3	P4	P5	P6	P7	P8	$\chi^2$
Adults	3	19	6	8	5	46	4	6	140***
Minors	18	5	1	0	4	11	74	47	
Total	21	24	7	8	9	57	78	53	257

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

This study divided age groups into adults and minors because most of the participants were school students under 20 and their parents. The chi-squared test result shows there is a statistically significant difference among the age groups and their source of obtaining the information on the SCPs ( $\chi^2 = 140$ ,  $p < .001$ ).

According to the result, 46.3% of minor participants answered that their source of information on KAERI

SCPs was from school (P7). Consequently, others (P8) and family (P1) followed with 29.3% and 11.3%.

On the contrary, most adults were introduced from the online community (P6) by 28.8%. Consequently, friends (P2) and KAERI website (P4) by 19.6% and 8.2% respectively.

## 4. Conclusion

Understanding the importance of citizens' role in science and technology, KAERI's SCPs are essential in promoting nuclear education and proliferating nuclear science culture to the public. This study attempted to test the effectiveness of KAERI SCPs and their difference in introductory sources by age group.

First, KAERI's SCPs have positive effects on improving citizens' perceptions toward nuclear energy. The average satisfactory scores rose from 3.52 to 4.33 and have statistical significance. Second, there is a difference in contact sources between different age groups. While adult groups received more information from the online community, minors got the most information from schools.

### 4.1. Policy Implication and Limitations

This result can be applied to planning new KAERI SCPs. Future SCPs should be planned differently for age groups because contact sources of SCPs varied among them. For minors, it would be best for KAERI to introduce SCPs in connection with school programs as they participate via school most frequently. For adults, KAERI may implement a more aggressive PR strategy in the online community since most adults learn about the programs through online communities.

Several limitations must be considered for further research. First, due to the COVID-19 crisis, only a small number of samples were tested ( $n = 257$ ). Second, all programs were merged into one single generalized result and thus cannot capture any non-significant effects of a particular SCP. Therefore, consistent analysis with more participants may provide further precise policy implications for future SCPs.

## REFERENCES

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