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Fostering Interest in Nuclear Power via Digital Games

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Introduction

- ▶ In our laboratory, we are studying communication methods related to the clearance system, spent nuclear fuel, and high-level radioactive waste.
- ▶ Among these methods, our study focuses on the use of digital games in public relations activities for nuclear power.

Background

- ▶ Interest in current nuclear power
From the public opinion survey on nuclear power (2024)
- ▶ A large proportion of people are unable to explain any item.
↓
- ▶ Many people have just heard of it but do not know the details.

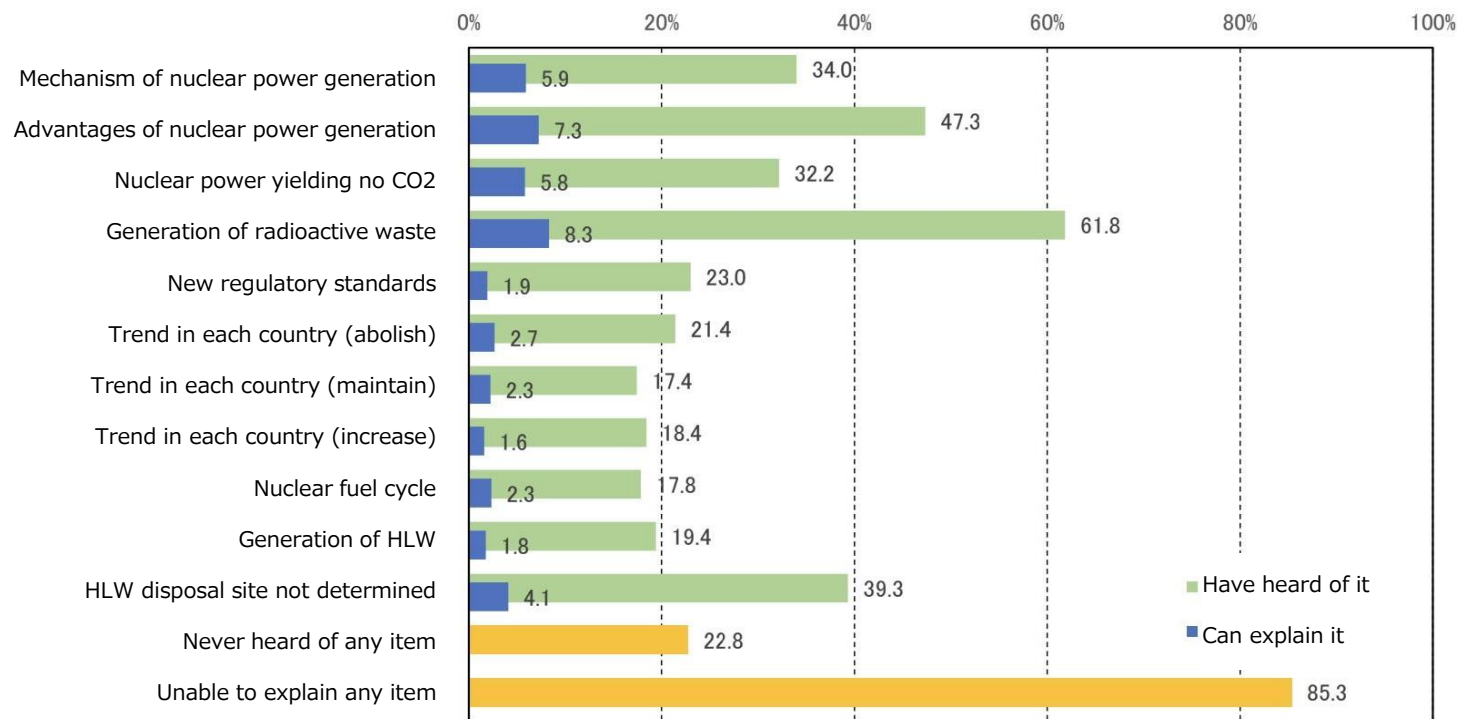
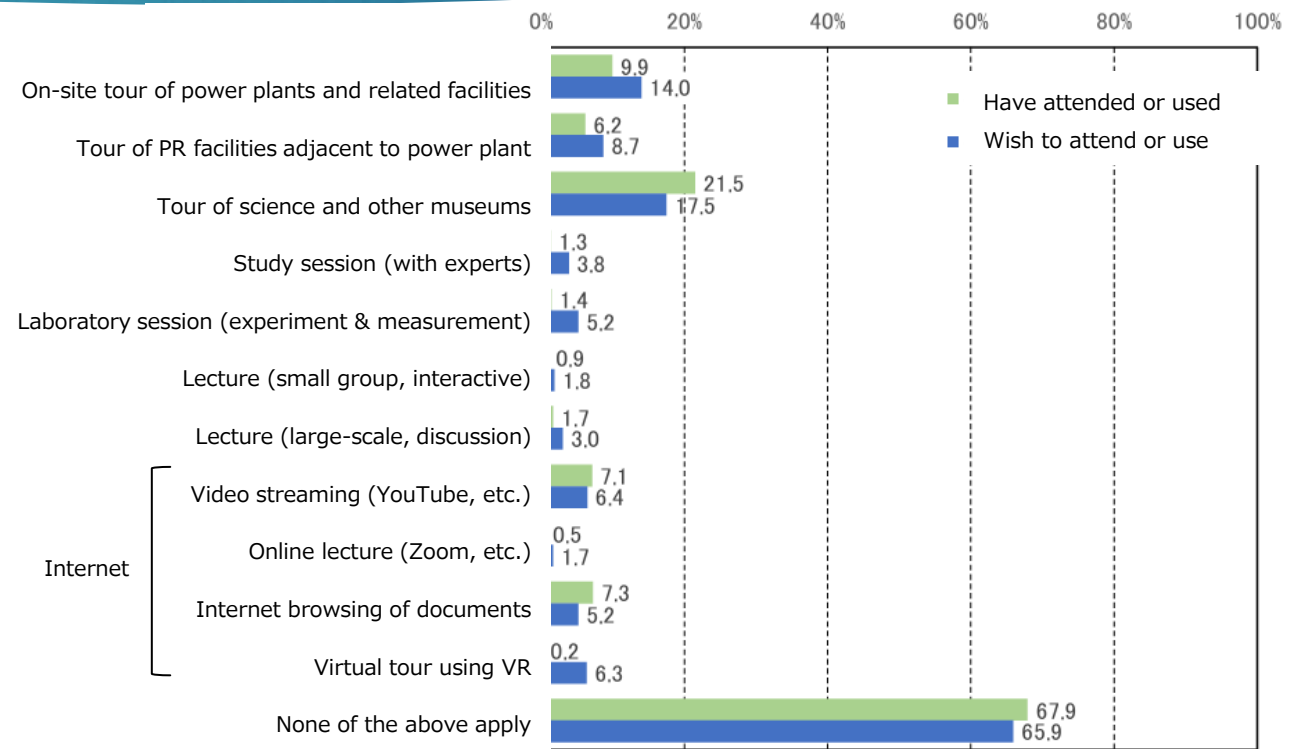


Figure 1. Amount of information in the field of nuclear power

Current Status

Public relations activities conducted on the Internet, such as those using video-sharing websites, are being carried out and have proven more effective than other methods.

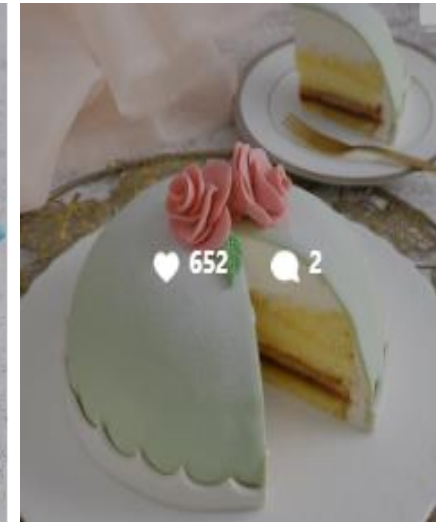
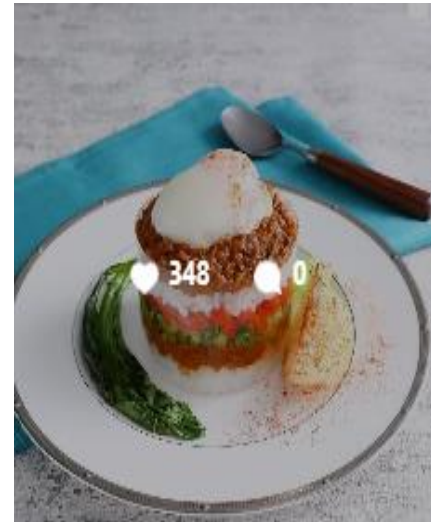
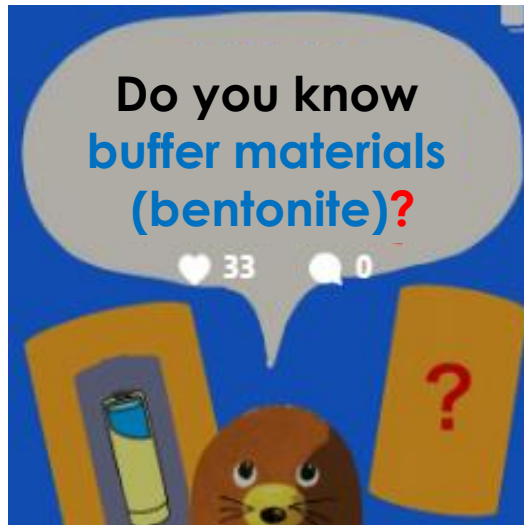
On the other hand, those who answered "none apply" account for 70%.



Source: The public opinion survey on nuclear power (2024) (p.83)
Japan Atomic Energy Relations Organization

Figure 2. Public relations activities on nuclear power that people have attended or used

Examples of SNS Posts



Nuclear Waste Management Organization of Japan (NUMO) (@num.jp),
picture and video on Instagram

Background

- ▶ Currently, there are limited opportunities to learn about nuclear power.
- ▶ Especially in elementary and junior high schools where nuclear energy is taught, the impact appears to be minimal.
- ▶ Recently, the use of digital games in education has been spreading.
- ▶ Could digital games also be used to teach people about nuclear power?
- ▶ “Trends in game-based learning research and future challenges”

https://www.mext.go.jp/miraino_manabi/content/376.html
<https://www.konami.com/games/momotetsu/education/>



Purpose

- ▶ To use games to address social challenges (so-called gamification) to attract interest in nuclear power in general.
- ▶ To explore an effective learning model that promotes interest in nuclear power by leveraging engagement with and active participation in digital games.

Preceding Research

- ▶ The same Minecraft version was used in this study.
- ▶ The significance level in Table 1 is 5% and that in Table 2 is 1%; therefore, these differences are statistically significant.

“Effects of a dialogue on disposal of high-level radioactive waste utilizing digital games” (Sachiyo Kamimura, Hayato Ishioka)
Policy and Practice Studies Vol. 11, No. 1, pp. 135-142, 2025

Table 1: Average prior and posterior comprehension scores

Theme	Prior	Prior standard deviation	Posterior	Posterior standard deviation	Mean difference
HLW	3.037	0.576	3.65	0.477	0.613
Energy mix	2.778	0.831	3.45	0.589	0.672

Note: *t*-test / Statistically significant at the 1% level**, Statistically significant at the 5% level*

Table 2: Average prior and posterior comprehension scores

Theme	Prior	Prior standard deviation	Posterior	Posterior standard deviation	Mean difference
HLW	3.333	0.816	3.7	0.458	0.367
Energy mix	3.222	0.737	3.6	0.49	0.378

Note: *t*-test / Statistically significant at the 1% level**, Statistically significant at the 5% level*

Figure 3. Change in prior and posterior comprehension

Design of Games

- ▶ The design was developed based on preceding research.
“Development of Teaching Programs for Children ‘to learn’ through High Concentration Using Gamification”
- ▶ Elements continued from previous research
Game worldview and role-playing elements
- ▶ Additional elements from previous research
Incorporating learning content and its branching paths into the game
Providing a sense of achievement based on the knowledge gained

Reasons for Using Minecraft

- ▶ Minecraft is widely played and easy to operate,
 ↳ which reduces the impact of players' inexperience or unfamiliarity.
- ▶ Various mechanisms can be created within the game, allowing for flexible improvements.
- ▶ The worlds (also known as stages or dungeons) created can be published and shared with others.
- ▶ In terms of copyright, its use for research and educational purposes presents no issues.

Survey Results

- ▶ The effectiveness of games developed with Minecraft was measured.
- ▶ The survey targeted high school and university students who visit the school festival and so on.
- ▶ A demonstration was conducted using the games to clarify the changes in interest by playing games through surveys and game results.

Identification of Interest

- Identification based on gameplay results

The difficulty of the game was adjusted according to the original level of interest of players.

Interest was identified based on the degree of progress of the games.

- Survey through questionnaire

Answers to questions were collected before and after the games played.



Conclusion

- ▶ The type of game developed is an important factor.
- ▶ Attracting players' interest is also essential.
- ▶ If people can experience it easily, their awareness and understanding of the clearance system can be enhanced.