

Comparative Analysis of Nuclear Education and Public Outreach: Korea vs Global

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1. Introduction

Public understanding of nuclear technology and radiation has become increasingly important in the past years amid global climate goals and energy debates. Many countries have expanded formal education curricula and public outreach campaigns on nuclear energy and radiation safety to address persistent misconceptions and risk fears. South Korea with its dynamic nuclear policy shifts provides a valuable case to examine how education and outreach influence public perception and workforce development. This study aims to compare the status and effectiveness of radiation and nuclear-related education and outreach in Korea versus other countries over the last years.

2. Methods and Results

2.1 Methods

A comprehensive mixed-methods approach was used. Quantitative data on public opinion and education outcomes were collected through literature review of international surveys (e.g. IAEA, OECD-NEA reports), national polls, and academic studies from 2018. Notably, we compiled polling data on nuclear energy acceptance across multiple countries (including Korea) and enrollment statistics in nuclear engineering programs. Key sources included the radiant energy Group's Public Attitudes toward Clean Energy (PACE) index, World Nuclear Association reports on opinion trends, and Korean Nuclear Society (KNS) polls. Formal education metrics (e.g. number of students in nuclear-related majors) were obtained from university records and government reports. We applied comparative statistical techniques to these data: for instance, time-series trend analysis (to detect changes in support or enrollment over years), chi-square tests to compare categorical survey responses by country and demographic, and ANOVA to assess differences in perception across age groups and regions. Qualitative content analysis was also conducted on case studies of outreach programs (such as Japan's post-Fukushima school curriculum and Korea's public forums) to evaluate their design and impact. We categorized outreach initiatives by target audience (student vs. general public vs. local communities vs. professional) and coded their outcomes (e.g. increase in knowledge, change in attitude, policy influence). Data triangulation ensured robustness: for example, survey findings on public sentiment were cross-checked against social

media sentiment analysis and policy outcomes (e.g. changes in nuclear energy plans) all analysis was done with proper ethical considerations, focusing on aggregated data. Tables and graphs were prepared to illustrate key comparative findings, and result were interpreted in a scientific, unbiased manner.

2.2 Results

2.2.1 Public Perception and Regional Differences

Global public opinion of nuclear energy has generally improved over the last years, with surveys showing rising support in many countries. Figure 1 highlights comparative support levels: Korea's public support for nuclear power remains high (around 72% in 2021), well above the global average (~46% in 2023) and slightly higher than many Western countries. Notably U.S. support hit a record ~75% in 2024, while the European Union's 2024 survey showed 56% of citizens viewing nuclear positively. In contrast, countries with recent nuclear accidents or phase-outs historically had lower support, though even their public acceptance is inching up (more respondents now favor reactor restarts or maintenance in Japan, and outright opposition has eroded). Regional variations are evident: emerging economies in Asia and the Middle East tend to be strongly pro-nuclear whereas some European countries remain more skeptical.

Demographics also mediate support age has an inconsistent effect. In Korea, as in some technologically advanced countries, older adults have been more supportive of nuclear energy's use than younger people. And Gender gaps persist worldwide (men consistently more supportive than women by 10~20% margin), which experts attribute to differences in risk perception and STEM exposure.

Korea's support (72.1% in a 2021 poll) is higher than the global average (46% in 2023) and the EU27 average (56% in 2024). The U.S. also shows high support (~75% in 2024). This reflects a trend of increasing acceptance in many countries over the last years

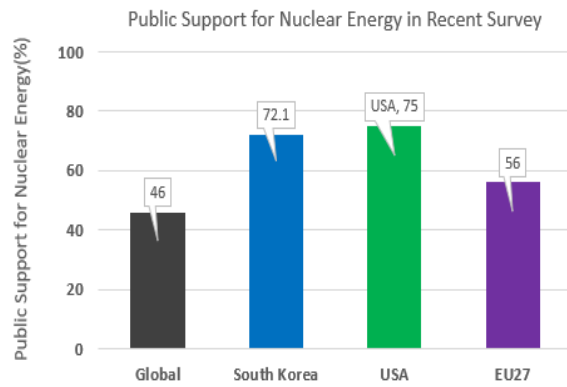


Figure 1. Public support for nuclear energy in Korea vs. other regions in recent surveys.

2.2.2. Formal Education Outcomes

Over the past years, nuclear and radiation-related higher education has seen notable shifts in South Korea compared to other major nuclear technology countries (USA, France, Japan). The table below summarizes key metrics-including university enrollment, graduation rates, program counts, and student outlook-highlighting changes, policy impacts, and comparative outcomes in formal nuclear engineering education.

Table 1. Key metrics of the overall trend in nuclear engineering

Metric (2018-2023)	South Korea	United States	France	Japan
Undergrad Nuclear Engineering Enrollment	~500–350 students	~1,500–1,300 students	~130–120 students	~120–100 students
Annual Nuclear Eng. Graduates	~150–100 per year	~600–550 per year	~110–100 per year	~90–75 per year
Universities Offering Nuclear Programs	7–7 (no net change)	30–30 (stable)	5–5 (stable)	90–75 (slight decrease)
Government Support & Funding	Increased	Increased/federal funding	Expanded (nuclear skills plan launched)	Renewed (gov. introduced new incentives)
Curriculum Updates	Updated ~20%	Modernized/added advanced reactors	Specialized tracks introduced	Safety-focused revisions
Graduate Employment Rate	~60%–90%	~85%–95%	~55%–68%	~50%–70%
Student Perception of Nuclear Careers	~35%–60%	~50%–65%	~70%–75%	~20%–30%
Radiation-Related Fields Enrollment	Steady/Rising	Steady	Stable	Stable
Workforce Supply vs Demand	Shortfall (improving)	Moderate gap	Emerging gap	Significant gap
Impact of Policy	Phase-out/review	Consistent support	Policy U-turn	Post-Fukushima Recovery

2.2.3 Informal Outreach and Public Engagement

A variety of outreach strategies have been deployed in the past years to engage the public on nuclear and radiation topics. Mass media campaigns remain a primary tool-for instance, Korea's nuclear agencies and KNS produced TV and online content emphasizing nuclear energy's safety improvements and role in reducing carbon emissions. However, outreach efficacy varies by target audience. For the general public, interactive and dialog-based approaches have shown success. Community-focused outreach is particularly crucial around nuclear sites. Targeted campaigns for professionals and educators have also been ramped up.

Table 2. Key metrics of the overall trend in nuclear engineering

Category	South Korea	USA	Japan	France	Key insight
Main strategies	Citizens' jury, SNS campaigns, Local forums	TV ads, plant-Neighbor community events	Radiation education museums, public forums	Mobile exhibitions, VR bus	Interactive communication is more effective than one-way messaging
Target audiences	General public, students, teachers, local residents	Public, college students, science Journalists	Students, Fukushima-area Residents	Local communities, energy stakeholders	Tailored approaches by age and region are essential
Notable example	2017 citizens' jury (Shin-Hanul 3&4 reactors)	Community engagement near nuclear Plants	School radiation programs in affected regions	EDF outreach via mobile demonstrations	Transparency and dialogue improve trust
Measured outcomes	Public consensus despite polarization, increased acceptance	88% support among residents near plants	Increased student knowledge and reduced fear	Public acceptance linked to experience-based education	Source credibility and interactivity boost Effectiveness

2.2.4 Effectiveness Metrics

We evaluated outreach effectiveness via several metrics. Public perception change: Globally, net support for nuclear energy has increased in the past years. In the EU, positive views on nuclear's future impact climbed in a majority of countries between 2021 and 2024. Policy support is another metric: increased acceptance correlates with more pro-nuclear policies or at least the political space to consider them. Educational outcomes: the effectiveness of education initiatives is reflected in improved knowledge scores and enrollment trends. Finally, risk perception and safety culture metrics indicate that outreach focusing on safety can alleviate fears. In a summary, engaged audiences interactively, delivered information through trusted channels, and contextualized nuclear technology's benefits and risks in everyday terms.

Table 3. Effectiveness metrics of Education and Outreach-comparative table

Metric	South Korea	USA	EU(Avg)	Japan	Evaluation
Public support change	65%→72%	65%→75%	45%→56%	30%→45	Rising support in most regions
Nuclear major enrollment	↓30%	↓13%	Stable	↓17%→slight Rebound	Enrollment follows policy trends
Policy impact	Citizen's jury directly influenced restart policy	Federal R&D funding and SMR support linked to public support	Policy momentum driven by energy transition	Policy clarity improved only post-2022	Public sentiment →policy action
Target group effectiveness	High school> general public> Teachers	University students> professionals> local residents	Mixed	Middle school> teachers> Residents	Early education is most effective
Trusted information channels	Professors, local experts most trusted	Peer communities, scientific influencers	Mixed (media, parties)	Teachers, local officials	'Who' delivers the message matters most

3. Conclusions

Over the past years, both Korea and other countries have made significant strides in educating outreach, yielding measurable improvements in awareness and acceptance. Globally, effective nuclear/radiation education and outreach share common elements: early integration of nuclear topics in formal education, which builds a foundation of knowledge and interest among

students: transparent, inclusive public engagement that invites dialogue and addresses specific concerns, and leveraging credible messengers to build trust. We also found that improving public understanding correlates with stronger policy support and can inspire the next generation to pursue nuclear-related careers, mitigating the looming workforce gap.

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