RADIOISOTOPES, **75**(S-01), S-006(2026)
doi: 10.3769/radioisotopes.S-006

Proceedings of ISORD-12

Fostering Global Nuclear Science Education: New Platforms of INSO and INSTA (Materials (Data))

Takeshi Iimoto[1, †], Irman Abdul Rahman[2], Maya Al-Azri[3], Helena Zhivitskaya[4] and Marina Mishar[4]

[1] The University of Tokyo
[2] Universiti Kebangsaan Malaysia
[3] Ministry of Education
[4] International Atomic Energy Agency
[†] iimototakeshi@g.ecc.u-tokyo.ac.jp

Received July 30, 2025
Accepted February 16, 2026

The International Nuclear Science Olympiad (INSO) and International Nuclear Science and Technology Academy (INSTA), which are two new networks supported by the IAEA, have begun collaborating on international activities aimed at identifying talented students and nurturing them into a skilled workforce in nuclear science and technology, with a focus on secondary and tertial education levels.

Key Words: nuclear science, education, human resource development, International Nuclear Science Olympiad and International Nuclear Science and Technology Academy (INSO INSTA)

1. Introduction

Nuclear science and technology (NST) including radiation application is increasingly important for countries and regions all around the world. The authors believe that this importance is expected to continue for the foreseeable future. However, despite growing demand, particularly in the Asia-Pacific region, there is a critical shortage of qualified human resources and effective mechanisms to train talented professionals in the field. To address this gap the International Atomic Energy Agency (IAEA) through its Technical Cooperation Programme (TCP), launched a series of regional projects (ID: RAS0069, 0075, and 0091) starting in 2012. This initiative aims to deliver high quality NST information and knowledge to secondary students, and still ongoing. Especially in the second phase of the TCP-IAEA (2018–2021), with the slogan "Educate one million secondary students in NST" incorporating STEAM education principles and a focus on the "WOW factor" to inspire curiosity and engagement. As a result, more than 2 million students successfully reached, even amid the significant challenges posed by the COVID-19 pandemic. Among those who reached through this initiative, many students had gone on to (1) aspire to higher levels of achievement, and (2) voluntarily deepen their studies and participate in related research activities.

International Nuclear Science Olympiad (INSO),[1)] and International Nuclear Science and Technology

© Japan Radioisotope Association 2026. This is an open access article distributed under the Creative Commons Attribution 4.0 International (CC BY 4.0) License (https://creativecommons.org/licenses/by/4.0/)

© 2026 Japan Radioisotope Association

Academy (INSTA)[2] started officially in 2024 with strong support from the IAEA through the above TCPs, and aimed at supporting education at secondary and tertiary levels in the field of NST with a regional focus on Asia and the Pacific region. A key component of this vision is the active inclusion of secondary science teachers and tertiary educators, who play a central role in inspiring and guiding the next generation of nuclear professionals. By empowering these educators alongside students, INSO and INSTA seek to build a robust pipeline of future experts, fostering a new generation of leaders in NST who can contribute meaningfully both within the region and globally.

2. International Nuclear Science Olympiad (INSO)

2·1 What is INSO?

INSO forms part of the global family of science Olympiads that foster academic excellence and international exchange among young learners. It offers selected secondary school students the opportunity to engage in rigorous challenges that test both their theoretical understanding and applied skills on NST. This initiative will raise awareness of the peaceful uses of NST, disseminate accurate knowledge, and cultivate a scientific approach to addressing real world nuclear issues. By sparkling increase in interest in NST among secondary students, to improve the teaching of NST at the secondary school level, INSO contributes to improving the quality of NST education at secondary level and encourages independent and creative problem-solving. INSO also serves as a platform to promote international collaboration and promote friendly relations among participants, while inspiring interest in careers related to NST. Furthermore, it encourages participating countries to establish their own national nuclear science Olympiads, thereby strengthening the education pipeline and supporting long-term development of human resources in the field.

2·2 Framework and INSO-1 (2024)

The first INSO (INSO-1) was held at Clark, Pampanga in Republic of the Philippines, on August 1–6, 2024. Students under 20 years old and before entering university were able to join the INSO, who won the national competition round in their respective countries. Each national team consisted of 2 leaders (NST experts) and 4 students, which was a maximum of 6 members. The top-level students, who were 55 student challengers from 14 countries mainly in the Asia-Pacific region, pursued gold/silver/bronze medals over a total of 8.5 hours of testing on their knowledge of and ability to apply NST, and the leaders graded the students. The 14 countries in INSO-1 were Bahrain, Malaysia, Mongolia, Singapore, Oman, Pakistan, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates, Qatar, Iran, Jordan, and the Philippines.

We, as IAEA experts, asked the students and teachers as the observers of INSO-1 why you registered INSO-1. The responds from the students were: “I studied physics at school, and I found nuclear science interesting and wanted to learn more about it (nuclear medicine was particularly appealing).” “Because participating in INSO-1 would allow me to visit a foreign country (in this case, the Philippines).” “Because I thought I would be able to make friends from abroad.” and “Because I can officially take a break from school during that period.”

2·3 Case study; Challenge of Japan to INSO-2

INSO-2 will be held at Bangi, Malaysia, from July 29–August 5, 2025. Japanese experts once tried to send the national team to INSO-1 and INSO-2, however they were facing to a lot of difficulties as follows. The authors imagine these difficulties

would be similar to the other countries who are planning to join INSO. "Can we find high school students who have no difficulty at all with English and also have a strong interest in physics and nuclear science and technology?" "Can we make a system for guiding and training them so that they can tackle questions, which are similar to the national professional exams for chief reactor engineers or radiation protection supervisors, with a certain amount of technical terminology without fear, based on guided explanations as hints?" "Can we find volunteer experts who can handle such specialized questions in both English and Japanese, and who can provide full guidance and cooperation throughout the entire process from the national competition round to the day of the closing ceremony for a long period?" Yes, at last Japan could. After big negotiation among Japanese stakeholders, finally, the National Committee and Secretariat of INSO-Japan[3] was established in Japan Atomic Energy Relations Organization (JAERO) on December 3, 2024, strongly supported by Ministry of Education, Culture, Sports, Science and Technology (MEXT) and Ministry of Foreign Affairs (MOFA) as well as Advanced Nuclear Education Consortium for the Future Society (ANEC) and Japan Nuclear Human Resource Development Network (JN-HRD.net). The national competition to select the Japan national team members was held on April 20, and the selected four students has studied by themselves and been trained by Japanese experts.

The Japanese challenge above would be one of good examples for potential participant countries. This is not just a competition—it's a gateway to empowering youth, enriching NST education, and becoming part of a growing global network committed to shaping a safer and more innovative future through science.

3. INSTA

3·1 What is INSTA?

INSTA is improving the baseline of young mid-career faculty members in tertiary education institutions in each country and expansion of their perspectives, and creation of possibilities for NST research activities at universities, graduate schools, etc. INSTA functions as a forum for cooperation among universities, training centers, research organizations, regulatory bodies, and other nuclear stakeholders, promoting the exchange of knowledge, pedagogical tools, and educational strategies. Central to INSTA's strategy is its Executive Program for Educators (INSTA EPE), which builds the skills and competencies of educators from diverse disciplines to effectively teach NST topics. With the IAEA's backing, the program fosters a pipeline of capable and confident educators who can advance NST literacy and its contributions to health, agriculture, energy, industry, and environmental protection. By supporting INSTA, the IAEA is helping Member States address one of the region's most pressing challenges: the shortage of trained educators and professionals in the nuclear field. INSTA represents a forward-looking response to this challenge built on regional ownership, international cooperation, and a shared vision for using NST to achieve the Sustainable Development Goals (SDGs).

The INSTA is now guided and operated under the steering committee (SC), consisting of the chair, the vice-chair, the executive secretary, and head and vice-head of three working groups, who are elected from the participant organizations. Tertiary-level educators, especially the newly designated ones, can begin their journey to expand their pedagogical knowledge, interpersonal skills, and emotional intelligence to inspire and guide their students while raising global awareness of NST.

3･2 Framework and case study of INSTA Round-1 (2024)

INSTA education system consists of two phases. The first round of INSTA activity successfully closed by the end of March 2025. Phase-I for it was from April–November 2024, targeting basic knowledge and basic educational skills, which was based on E-learning (in collaboration with ANENT and OUM), consisting of three modules. Module 1 is for educational strategy, methods and techniques, Module 2 is for fundamentals of NST, and Module 3 is for application and development of NST. Each Module can be achieved by (1) attending 3 compulsory subjects +2 elective subjects (total 10 hours) of approximately 2 hours per session, (2) 2 hours of presentation, (3) 2 hours of discussion and exchange of opinions, (total 14 hours). That means an individual must complete a total of 42 hours training in Phase-I. Entry into Phase-I requires a recommendation from an INSTA member. Upon completing the e-learning combined with remote-mode courses of Phase-I and gaining approval from the SC, participants can advance to Phase-II, for application and field skills, to join an on-site school hosted by INSTA members.

The official first Phase-II school in the first round of INSTA was held in Japan, led by Prof. IIMOTO, The University of Tokyo (UTokyo), in March of 2025, which was hosted by NPO Science and Technology Forum (STIF) strongly supported by UTokyo, MOFA, MEXT, and Japanese Volunteer Expert Team (JVET).[4] The school was entitled as INSTA Spring School of Advanced Radiation Protection Focusing on NORM (Naturally Occurring Radioactive Materials) under Risk Management & Communication. 12 participants from 10 countries were selected by SC of INSTA. The school consisted of 5 days remote and 6 days onsite modes with total 17 lectures by radiation protection experts and 4 presentations by young PhDs of UTokyo; 4 site visits; (1) Japan Chemical Analysis Center, (2) a police station (3) a fire station (4) an accelerator facility of UTokyo; opening ceremony, holiday service program, welcome ceremony, official dinner, and closing ceremony; 15 min participant presentations on NORM status of the country; 20 min group presentations (3 participants in one group, total 4 groups) on strategy of NORM-RP education with WOW factor. The participants' relevant knowledge and educational skills improved significantly during the program, with average scores on three confirmation tests conducted on the first, sixth, and eleventh days rising from 60% to 83% to 91%. In addition, based on questionnaire responses, participants reported extremely high levels of achievement and satisfaction. These results and further details will be published on the INSTA website soon.

The following Phase-II schools for the round two from April 2025 are planned to be held in Malaysia, targeting Radiation in Medicine, or in China, targeting Nuclear Engineering, etc.

4. Conclusion

These two active networks, INSO and INSTA, have just been launched and started with the deep understanding and strong support of stakeholders in the world. The authors warmly invite more countries and organizations to join this growing international effort to advance education, collaboration and capacity building in nuclear science and technology.

Author Information

Author Contributions

Takeshi IIMOTO: Conducting the study and writing the paper, 0000-0002-5020-6889

Irman ABDUL RAHMAN, Maya Al-AZRI, Helena ZHIVITSKAYA, and Marina MISHAR: SC members and/or key members of INSO and INSTA with T. Iimoto

ORCID Number

Takeshi Iimoto: none

Irman Abdul Rahman: none

Maya Al-Azri: none

Helena Zhivitskaya: none

Marina Mishar: none

Disclosure of Conflicts of Interest

There are no companies or other entities with which all authors have a conflict of interest (COI) related to this paper that should be disclosed.

References

1) https://inso.science/ (accessed February 12, 2026)
2) https://www.iaea.org/services/networks/insta (accessed February 12, 2026)
3) https://www.jaero.or.jp/inso2_japan/1_index_detail.php (accessed February 12, 2026)
4) https://jvet.jp/archives/seminars/ttws2025 (accessed February 12, 2026)