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DEVELOPMENT AND IMPLEMENTATION OF ONLINE TRAININGS AT ISCN/JAEA

Naoko INOUE[1], Naoko NORO[1], Yoko KAWAKUBO[1], Megumi SEKINE[1], Masahiro OKUDA[1], Nobuhiko HASEGAWA[2], Yosuke NAOI[1]

[1]Japan Atomic Energy Agency, 765-1 Funaishikawa, Tokai-mura, Ibaraki, 319-1184, Japan
[2]NESI Inc., 38 Shinkoucho, Hitachinaka-shi, Ibaraki, 312-0005, Japan

ABSTRACT

Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) of Japan Atomic Energy Agency (JAEA) celebrated its 10th anniversary in December 2020. One of its pillars is capacity building support mainly for Asian countries. 182 trainings courses/workshops with the traditional in-person format, were implemented with 4,626 participants since its establishment through the end of March 2020. Travel restriction due to the COVID-19 pandemic has impacted in the implementation of these activities especially regional/international courses since March 2020. In April 2020, ISCN/JAEA decided to transit to the online format and started to develop the online trainings with two major regional trainings. Based on this success, further two regional training/exercise and three national workshops/training were developed with online format and implemented, in addition to host an IAEA online international training. In total, nine online courses/workshops were developed and provided to 279 participants from 31 countries, from October 2020 to July 2021.

This paper will provide the efforts of ISCN/JAEA how to address the online training development and implementation, lesson learned, challenges and future plan.

INTRODUCTION

Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) was established for strengthen nuclear nonproliferation and nuclear security mainly for Asia region. One of its pillars is capacity building support and 182 training courses/workshops with the traditional in-person format were implemented with 4,826 participants from its establishment in 2010 through the end of March 2020 (FY2019). In spite of these good results, the challenges have been experienced such as travel difficulties due to security and safety reasons, limited number of participants (all applicants cannot participate, usually), and varied knowledge level of selected participants. Online course development was a potential solution, that ISCN/JAEA was considering but could not address because of resource limitation.

Travel restriction due to the COVID-19 pandemic has impacted in the implementation of these in-person trainings, especially regional/international courses since March 2020, which pushed for

the decision of online course development. In April 2020, ISCN/JAEA decided to transit to the online format as the mitigation measure, and started the development of the online trainings with two major regional trainings, Physical Protection (PP-RTC) and State System of Accounting for and Control of nuclear materials (SSAC) for IAEA Safeguards (SSAC-RTC). The online PP-RTC was implemented in October 2020 in collaboration with DOE/NNSA and U.S. Sandia National Laboratories (SNL). The online SSAC-RTC was conducted in November, 2020, in collaboration with the IAEA.

Based on these successful transition, two more regional trainings, two national workshops with foreign instructors/lectures and a national training were developed and implemented, and hosted an IAEA international training in online format, shown in Table 1.

FEATURES OF ISCN/JAEA ONLINE COURSE DEVELOPMENT

Concept of Online Course development

The traditional features of ISCN/JAEA capacity building activities are to be “qualified” and “unique”. The use of JAEA actual facilities and its broad nuclear expertise contributes to the uniqueness of ISCN training. Systematic and tailor-made approach for development of training curriculum with implementation is supported by qualified technical assistance. This concept was also applied in the development of the online PP-RTC and SSAC-RTC.

Restriction and condition of online format were identified and relevant solutions were also discussed. It was considered that the participants can maintain their concentration only for 2-3 hours for online format, while it is usually a full day of ten days (two weeks) in an in-person course. By combining e-learning (EL) with interactive learning (IL) using web meeting tool, ISCN/JAEA obtained the prospect of developing a curriculum that can achieve almost the same learning objectives in the same two-week period as the traditional in-person trainings even with online ILs of 2-3 hours per day. The structure of the developed online trainings with the combination of Els and ILs is shown in Figure 1.

The commercial web meeting tools had undergone a dramatic evolution, due to COVID-19 pandemic. Zoom meeting was widely used in the world and was selected as the interactive learning platform in June 2020, in consideration of the security policy of JAEA, good encoding/decoding technology contributing to stable connection, functionalities such as breakout, chat and annotation, and user-friendliness. It was also determined that JAEA e-learning platform and IAEA CLP4NET (Cyber Learning Platform for Network Education and Training) were used as the e-learning platform for PP-RTC and SSAC-RTC, respectively.

Table 1. Online training courses/workshops developed/hosted by ISCN/JAEA

	Title	Date	Event type	Collaboration with	Participants
1	Regional Training Course on Physical Protection (PP-RTC)	19-30 October 2020	Regional training	DOE/NNSA, SNL[1]	14
2	Regional Training Course on State System of Accounting for and Control of nuclear materials (SSAC-RTC)	9-20 November 2020	Regional training	IAEA, JSGO/NRA[2], METI[3]	15
3	Workshop on Nuclear Security Culture Self-Assessment	10 December 2020	National workshop	IAEA, BATAN[4] Kozloduy Nuclear Power Plant (Bulgaria)	53
4	Additional Protocol Commodity Identification Training (AP-CIT)	9-10 February 2021	Regional training	INSA/KINAC[5], IAEA	16
5	ISCN-WINS Workshop	16-17 February 2021	National workshop	WINS[6]	47
6	Demonstration of Complementary Access (CA), Nuclear Security and Safeguards Project of FNCA	19 February 2021	Regional exercise	FNCA[7]	21
7	ISCN-ACE Joint Training Course on Technology for Nuclear Non-proliferation	22 March 2021	Regional training	ACE[8]	76
8	Training on Insider Threat	22-23 April 2021	National training	NRA	20
9	International Training Course on Safeguards Implementation in States with Small Quantities Protocols	5-9 July 2021	IAEA international training	IAEA (hosted by ISCN/JAEA)	12

1: U.S. Sandia National Laboratories, 2: Japan Safeguards Office/National Regulation Authority, 3: Ministry of Economy, Trade and Industry (Japan), 4: National Nuclear Energy Agency of Indonesia, 5: International Nuclear Nonproliferation and Security Academy/Korea Institute of Nuclear Non-Proliferation And Control, 6: World Institute for Nuclear Security, 7: Forum for Nuclear Cooperation in Asia, 8: ASEAN Centre for Energy

Partnership

Collaboration is the key in any projects. ISCN/JAEA maintained the close collaboration with DOE/NNSA and SNL for the online PP-RTC and IAEA for the online SSAC-RTC as well as in-person trainings, from the development through the implementation.

It was found that more experts could be involved in the online format because the meetings for development and dry-run could be also carried out online, without travel. This contributed to reflect wider expertise in the course material development through direct dialogues between the experts. In case of the regional online Additional Protocol for IAEA Safeguards Agreement Commodity Identification Training (AP-CIT) shown in Table 1, International Nuclear Nonproliferation and Security Academy/Korea Institute of Nuclear Non-Proliferation And Control (INSA/KINAC) collaborated as did in the past in in-person format. This collaboration also added their valuable expertise on export control to the training.

Even in the online national workshop, the foreign experts, such as Indonesia, Bulgaria and IAEA, could participated and shared their good practices with Japanese experts via simultaneous English-Japanese translation on Zoom platform.

International collaboration or partnership is more important and beneficial in development of qualified online capacity building support activities.

Transition to Online Format from In-person Format

The defining learning objectives is the first step of course development. Revisit and careful review of the learning objectives of the in-person PP-RTC and SSAC-RTC that were implemented until 2019, were carried out. Then, it was considered that the learning objectives can be maintained, since the combination of ELs and ILs can achieve the same learning objectives with slight adjustment even with online format.

Therefore, development of the online course curriculum was started with transition of the traditional (in-person) curriculum. The summary is shown in Table 2. Details on the development are described in [1] and [2].

Table 2 Online Training Transition

In-person format	Online format
Lectures	E-learning (EL) & Interactive learning (IL)
Quiz & Answers	Quiz in EL, polling function of Zoom in IL
Group Exercises	Break out function of Zoom
Spent fuel verification process with Virtual Reality (VR) System with 3D	3D VR contents converted to 2D Video format in EL
DIQ* Exercise at JAEA research reactor facility	DIQ exercise using virtual tour[3] of JAEA research reactor facility
Hands-on NDA** Demonstration	Live demonstration in IL/ demonstration videos

	in EL
Group presentation	Zoom
Group photo	Screen capture
Hiroshima/Nagasaki visit	Virtual visit (under development)
Reception	Remo conference (under preparation)

*: Design Information Questionnaire, ***: Non-destructive Assay

Agenda Development for ILs

The format of the nine trainings/workshops that ISCN/JAEA developed is shown in Table 3. The timetable of the ILs was optimized to take into account the time which participants were expected to be able to concentrate and the effectiveness of the training, as well as the time zones of the IL, taking into account the time difference between the participants and the partner institutions. Regional and national training courses have advantage in this regard, because they are located in the close or same time zone. As a result, three different agenda types were developed as shown in Figure 1 to Figure 3.

The agenda consisted of lectures, review sessions with Q&A to answer the questions participants had during e-learning, and interactive exercises such as group discussions and presentation, responding to the questions from the instructors, and demonstrations. It should be noted that there are fewer lectures especially in SSAC-RTC (Figure 2) and AP-CIT (Figure 3). This is because most of the lectures to acquire knowledge in the in-person courses were replaced with EL modules. The ELs were effective for this purpose, since the participants could execute the EL modules at their own speed and repeated the modules and quiz until they were confident that they acquired the knowledge. In the review/Q&A sessions, the instructors assisted the participants through highlighting the important points and answering their questions, and discuss the additional questions with the participants.

It was found that the participants felt that 45 minutes was too short for the group discussion and the exercises. One of the major lessons learned was that it is better to plan the interactive exercise for longer than 45 minutes.

DELIVERY OF E-LEARNNGS and INTERACTIVE LEARNINGS

Delivery method of ELs and ILs

Most of the training courses in Table 3 consisted of the ELs and ILs, and JAEA E-learning platform and IAEA CLP4NET were used for ELs delivery. JAEA E-learning platform was originally designed only for internal use and some participants experienced significant difficulties to access it. ISCN/JAEA is preparing an external learning management system (LMS) that is compliant with JAEA IT security policy but still user-friendly.

Table 3. Implementation of Online Trainings/Workshops

	Title	Delivery method	IL Format
1	Regional Training Course on Physical Protection (PP-RTC)	IL: Zoom meeting EL: JAEA E-learning platform	10 days, two-45 min. session with 2-hour break in between per day
2	Regional Training Course on State System of Accounting for and Control (SSAC-RTC)	IL: Zoom meeting EL: IAEA CLP4NET	10 days, 3-hour session per day
3	Workshop on Nuclear Security Culture Self-Assessment	IL: Zoom meeting	One day, 2.5 hours
4	Additional Protocol Commodity Identification Training (AP-CIT)	IL: Zoom meeting EL: JAEA E-learning platform	Two days, 7-hour session per day
5	ISCN-WINS Workshop	IL: Zoom meeting	Two days, 2.5-hour session per day
6	Demonstration of Complementary Access (CA), Nuclear Security and Safeguards Project of FNCA	IL: Zoom meeting	One day, 70 min.
7	ISCN-ACE Joint Training Course on Technology for Nuclear Non-proliferation	IL: GoToMeeting (hosted by ACE)	One day, 3-hour session
8	Training on Insider Threat	IL:Zoom/Webex Hybrid	Two days, 3-hour session per day with 1-hour lunch break
9	International Training Course on Safeguards Implementation in States with Small Quantities Protocols	IL: Zoom meeting EL: IAEA CLP4NET	Five days, 3-hour sessions per day

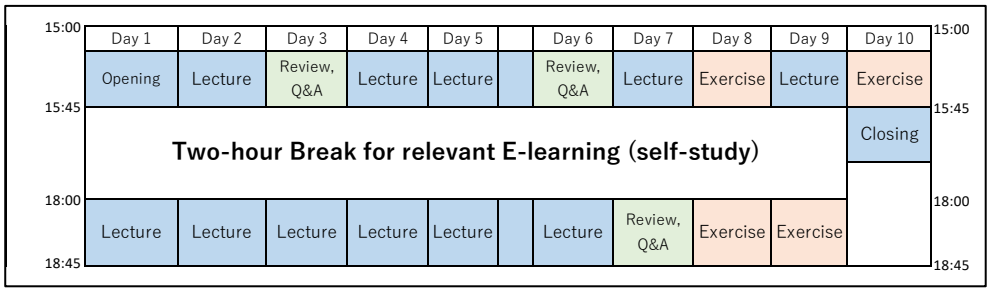

Figure 1. PP-RTC timetable, 10 days, two-45 min. session with 2-hour break per day

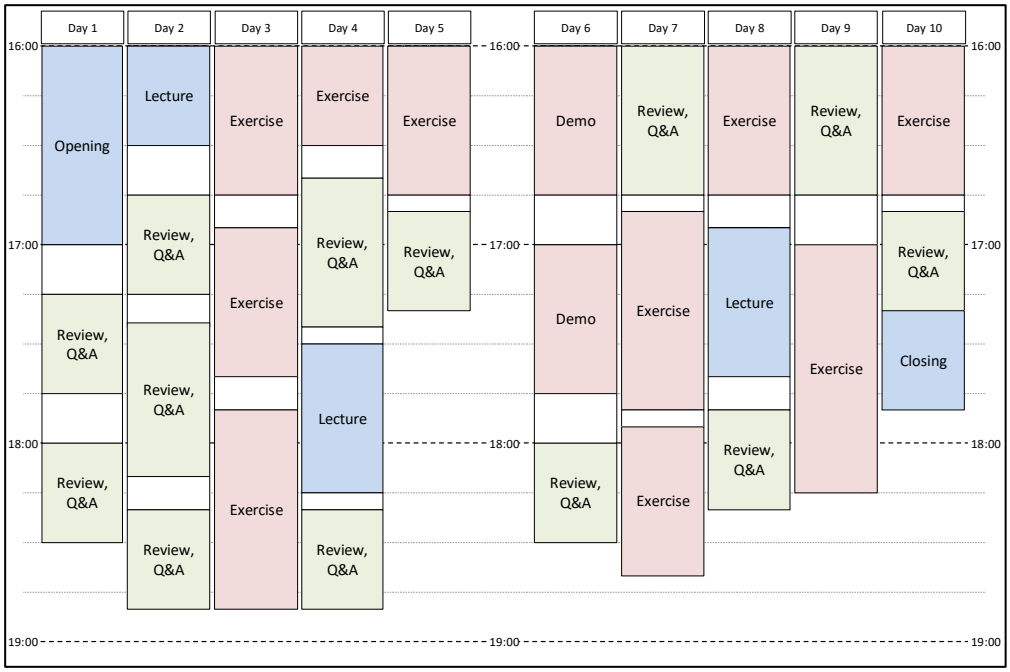

Figure 2. SSAC-RTC timetable, 10 days, 3-hour session per day

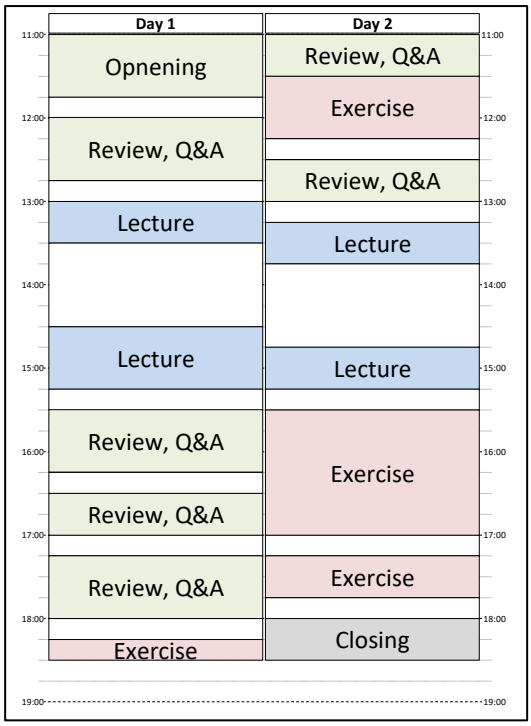

Figure 3. AP-CIT timetable, Two days, 7-hour session per day

Zoom meeting was used for ILs delivery when ISCN/JAEA hosted the trainings/workshops. Zoom/Webex hybrid was used for the national Training on Insider Threat, since some of the participants could use only Webex from office by their IT security policy. But this method is not recommended, because the instructors and technical assistants needed more efforts to share what a Zoom participant said with Webex participants, and vice versa.

ILs Delivery

Selection of the delivery venue, its layout and appropriate equipment are all very important in online training/workshop delivery. A large meeting room with high speed (giga-byte class) internet connection is preferable for the delivery venue, though well-designed studios are ideal. A large meeting room provided sufficient room for both of the main session and the breakout sessions keeping direct communication within the host team without voice interference with each other during breakout sessions. The good layout of the venue with optimized distance between the breakout groups, the use of partitions also contributed both to avoid voice interference and to maintain the social distance. Use of appropriate equipment such as the PCs with fast CPU, headset (with wired connection), webcam, etc. should not be underestimated. They contributed to stable delivery and audio and video quality, that affect concentration of the participants.

In case of ISCN/JAEA, qualified technical assistants greatly contributed to the implementation of the ILs with high quality. They support not only the participants but also the instructors.

The dry-runs, connection tests, good team work and good coordination are crucial for IL implementation. The dry-runs are more important than in-person format, since the ILs are very short comparing the in-person. Connection test is recommended to carry out a week before the first day of the IL. In case that any connection difficulties are found in the test, both of course provider (i.e. technical assistants) and the participants can cooperate to solve such issues. Good team work with good coordination is the key of success for anything. Especially good coordination is more challengeable than the in-person, because a greater number of experts/assistants can be involved.

The detail experiences of the implementation are described in [1], [2] and [4].

LESSON LEARNED

The followings contributed to the qualified trainings/workshops developed and implemented by ISCN/JAEA;

- Combination of ELs and ILs
- Selection of web meeting tool
- User-friendly EL platform
- International partnership in every process of the development and implementation
- Systematic development approach
- Curriculum and timetable that fit for the course objectives

- Single web meeting tool in a course
- Selection of delivery venue, layout and the use of appropriate equipment
- Qualified technical assistants
- Dry-runs, connection test a week before the first IL day
- Good teamwork with good coordination

CHALLENGES AND FUTURE PLAN

Unfortunately, it is still unclear when the impact of COVID-19 pandemic will subside. Online trainings/workshops will continue to play a central role in capacity building support for a while. ISCN/JAEA continues online trainings/workshops in FY 2021-2022 with further improvement. Some examples are follows;

- Improvement of ELs and E-learning platform
- Development of the virtual Hiroshima visit for the online PP-RTC and SSAC-RTC
- Improvement of the networking function among the participants

They will be included in the second online PP-RTC planned in October 2021 and the second SSAC-RTC in November-December 2021.

With the view to the post-COVID-19 era, ISCN/JAEA intends to collaborate with the international partners to develop the new curriculum of trainings, combining online and in-person formats, such as an online training as the pre-requisite of in-person trainings. This could enable to streamline the traditional in-person trainings or more efficient, or potentially develop new advanced trainings, as well as provide training opportunities for those who have difficulties in the travel to Japan.

CONCLUSION

ISCN/JAEA developed and implemented the nine online trainings/workshops from October 2020 to July 2021 as the mitigation measure of COVID-19 pandemic, in collaboration with the international/domestic partners. As the result the qualified capacity building supports were provided to 270 participants from 31 countries in this period by ISCN/JAEA and its international/domestic partners. The development and implementation of the online courses were described and the lesson learned from the experiences, challenges and future plan were identified. With the view to the post-COVID-19, ISCN/JAEA intends to develop the new curriculum of trainings, with the combination online and in-person format in collaboration with its international partners.

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