

# Empowering the Nuclear Security-Related Officer

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## ABSTRACT

The incidents of radioactive material smuggling in 2020 proved that the nuclear security threat in Indonesia is real. It also shows that Indonesian police and security officers' knowledge of nuclear security needs to improve continuously. In response, Universitas Gadjah Mada's Nuclear Engineering Program composed a three-day training program to empower the role of local police, National Search and Rescue Agency (BASARNAS), and National Counter Terrorism Agency (BNPT), whose duty are to handle nuclear-related security. The objective of the training was to refresh their capabilities in dealing with nuclear security issues after the absence of training since the Covid-19 pandemic in 2020-2021. The subjects were divided into ten sessions and were delivered through coursework and discussion, tabletop exercises, and laboratory exercises. The pre-tests and post-tests were conducted to assess the trainee's improvement of knowledge and the benefits they experienced. The pre-test and post-test results showed that after attending the training, all participants understanding increased sharply as the delivery method was interesting and the materials were useful for participants. Finally, practice or playing games became the most preferred delivery method. Therefore, we can conclude that this training became an effective way to empower nuclear security-related officers.

**Keywords:** Awareness, Empowering, Nuclear Security, Safety Officer

## 1 Introduction

Indonesia is an archipelagic country that has approximately 17.000 islands within its border. Therefore, most of the territory is separated by sea or open water areas. This condition will cause complex problems regarding nuclear security enforcement. On a bureaucratic level, many government agencies have authority over nuclear security matters and agencies that possess radioactive sources as part of their fuel; hence, coordination between agencies should be synchronized to address nuclear security matters effectively. Officers who will be responsible for nuclear security preparedness if there is a situation involving nuclear security issues are the police (POLRI), national search team officers (BASARNAS), radiation protection officers at nuclear facilities, and the national agency for counter-terrorism (BNPT). A case of radioactive material smuggling in 2020 showed that the threat to nuclear security is a real problem that needs to be addressed [1]. In general, the understanding of the officers in charge to evaluate nuclear security status in a given situation is still very limited. Therefore, upgrading their knowledge regarding nuclear security becomes a crucial issue.

Previously, nuclear security training was held three times in several cities in 2016, 2018, and 2019. From the participants' input, they felt that this training is very beneficial, especially for front-line and security officers, to enhance their practical skills in tackling nuclear security issues in their daily jobs. However, in 2020-2021 as the COVID case increased, this training was postponed due to public health reasons. As the case of COVID steadily decreased in 2022 and at the request of some government agencies, the training is offered again by the Department of Nuclear Engineering and Engineering Physics, Universitas Gadjah Mada.



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## 2 Research Methodology

The training will be offered through coursework (Figure 1), class discussion, tabletop exercises, and laboratory works [1]. Before and after attending the training, all participants took preliminary and post-tests to measure their understanding of the subjects and also filled out the questionnaire to give input and suggestions for subsequent training.



**Figure 1:** Course delivery

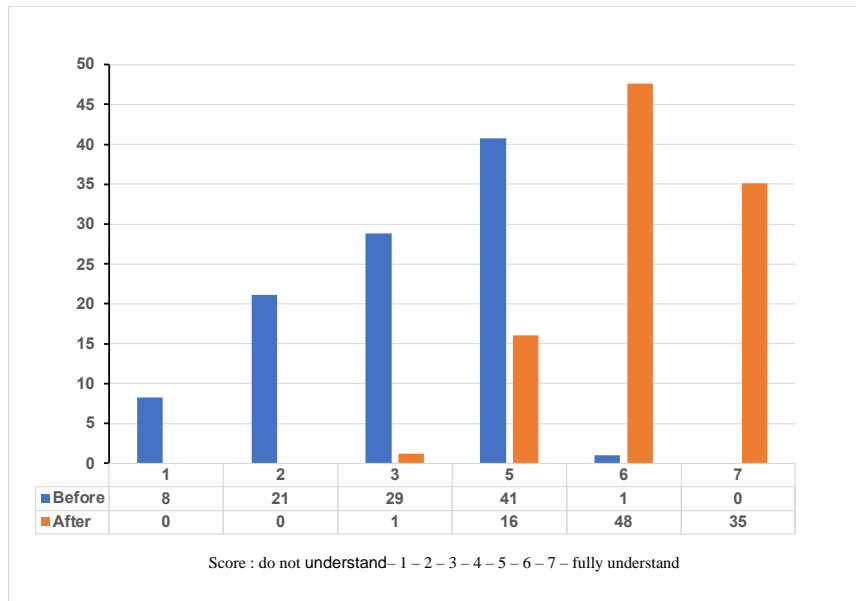
## 3 Theory and Calculation

An evaluation was done for nuclear security training subjects in 2018-2019, with a comparison of subjects between 2018-2019 and 2022 shown in Table 1.

**Table 1:** The differences between 2018-2019 and 2022 subjects.

Session	2018-2019	2022
1	Introduction to Nuclear Radiation	Introduction to Nuclear Radiation
2	Risks and Benefits of Nuclear Radiation	Risks and Benefits of Nuclear Radiation
3	Introduction to Nuclear Radiation Detection and Detector for Nuclear Security	Introduction to Nuclear Radiation Detection and Detector for Nuclear Security
4	Radiation Detector Exercises	Nuclear Security Principles and Global Cases
5	Nuclear Security Principles and Global Cases	Nuclear Emergency Procedures
6	Nuclear Emergency Procedures	Psychology for Nuclear Security
7	Psychology for Nuclear Security	Introduction to Nuclear Installations and Radiation Facilities
8	Introduction to Nuclear Installations and Radiation Facilities	Introduction to Physical Protection Systems
9	Introduction to Physical Protection Systems	Radiation Detector Exercises
10	Tabletop Exercises	Tabletop Exercises
11	Nuclear Security in Transportation	
12	Nuclear Material Transportation Case Study	

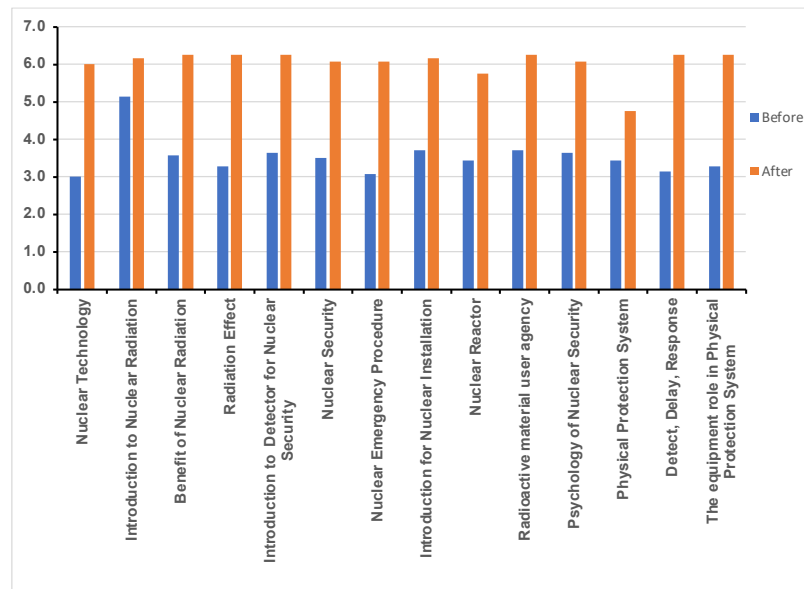
The number of participants for training in 2022 is limited to comply with government regulations regarding health protocol. Fourteen participants consist of 11 police officers from Yogyakarta province, two from the national search team, and one from the national counter-terrorism agency. This training was the first kind for the national search team after they requested the Department of Nuclear Engineering and Engineering Physics to join the training [2].



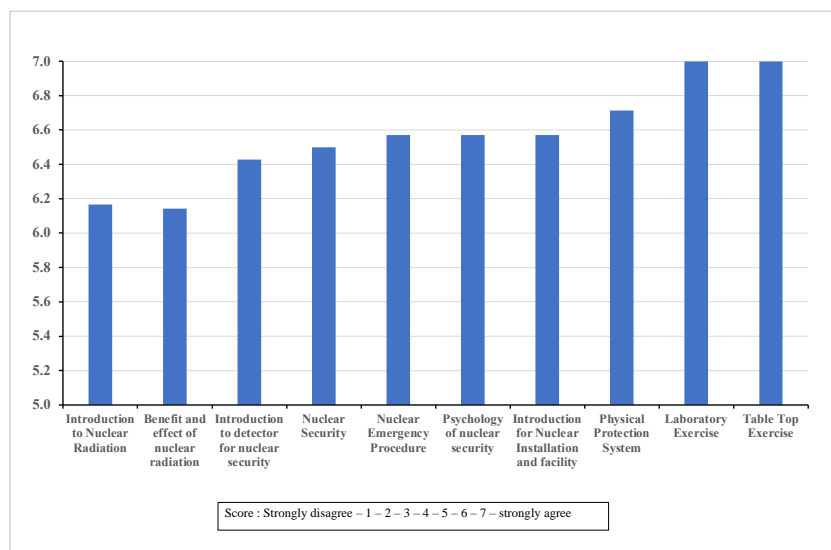
**Figure 2:** General understanding of nuclear security before and after training.

Evaluation of the training's effectiveness is performed by administering pre and post-test. The participants were asked to respond to questions by giving scores from 1 to 7 to reflect their understanding of certain subjects. Score 1 is where the participants think they did not understand, and 7 is where they fully understood the subjects. From the evaluation of the response, it can be concluded that the training is well received and showed a significant increase in the understanding of nuclear security issues. The result of the pre and post-test is given in Figure 2. Figure 2 shows a significant gain in knowledge following the training. Figure 3 shows responses relating to the understanding of specific training topics. It shows that most of the trainees have sufficient knowledge about radiation, radiation detectors, users of radiation and radioactive sources, nuclear security threat, and nuclear emergency cases. However, they also confirmed that they still need a deeper understanding of nuclear technology and emergency preparedness. Most trainees with a good understanding came from a police officer in Yogyakarta province and previously attended similar training in 2018 in the Department of Nuclear Engineering and Engineering Physics or elsewhere. Therefore, for these participants, this training functions as a refreshment course. On the other hand, the participants from BNPT and BASARNAS generally did not previously know about nuclear security. However, after finishing this training, they said their understanding increased significantly.

After the training, questionnaires were distributed to the participants to get their comments on the courses' quality, efficiency, and value. The result of the questionnaire is given in Figure 4. It can be concluded from Figure 4. that the trainees are very interested in the courses because they feel that they would benefit them. Moreover, they also commend that training on radiation detectors (Figure. 5) is essential for them, and Tabletop Exercises (Figure. 6) could build a better understanding of detection, delay, and response concepts. On the other hand, topics about radiation theory, application, and effect of radiation produced lower scores than the others because part of the trainees had already previously learned these topics



**Figure 3.** Degree of understanding for each topic before and after training



**Figure 4:** The importance of the topic for trainee

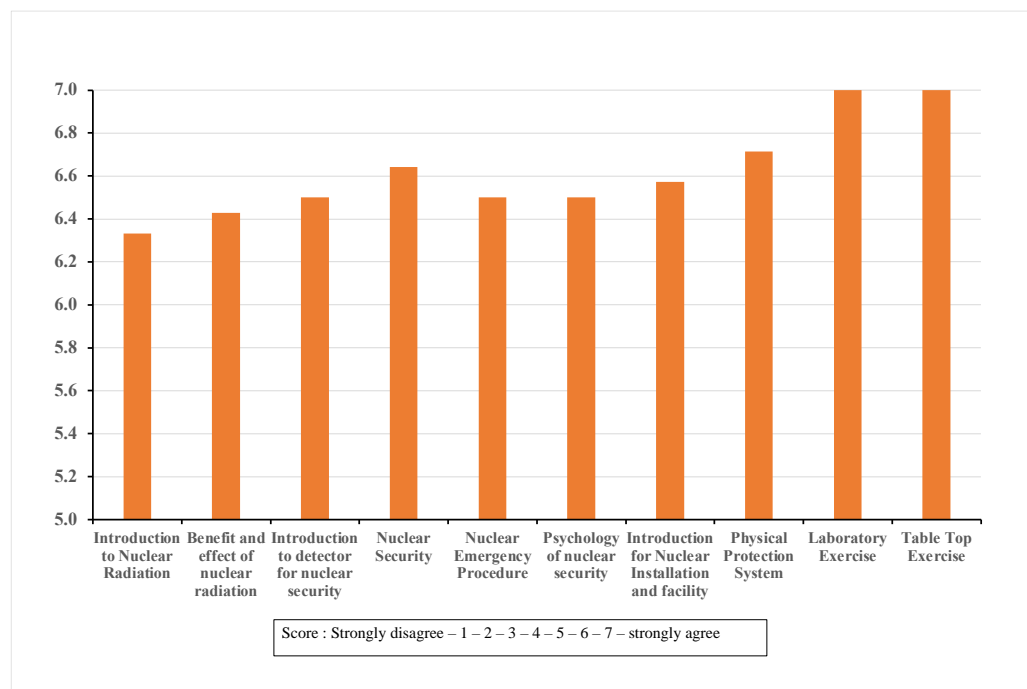


**Figure 5:** Radiation Detection and Source Identification Labworks



**Figure 6:** *Tabletop Exercise using scenario arranged in 2015 [3].*

The result of the questions about delivery methods is given in Figure 7. This figure shows that the trainees are very enthusiastic when the topics are given through practice in the laboratory using a detector and Tabletop Exercise. The two lowest scores were topics about radiation theory and effect radiation because most of the trainees had already learned it previously.

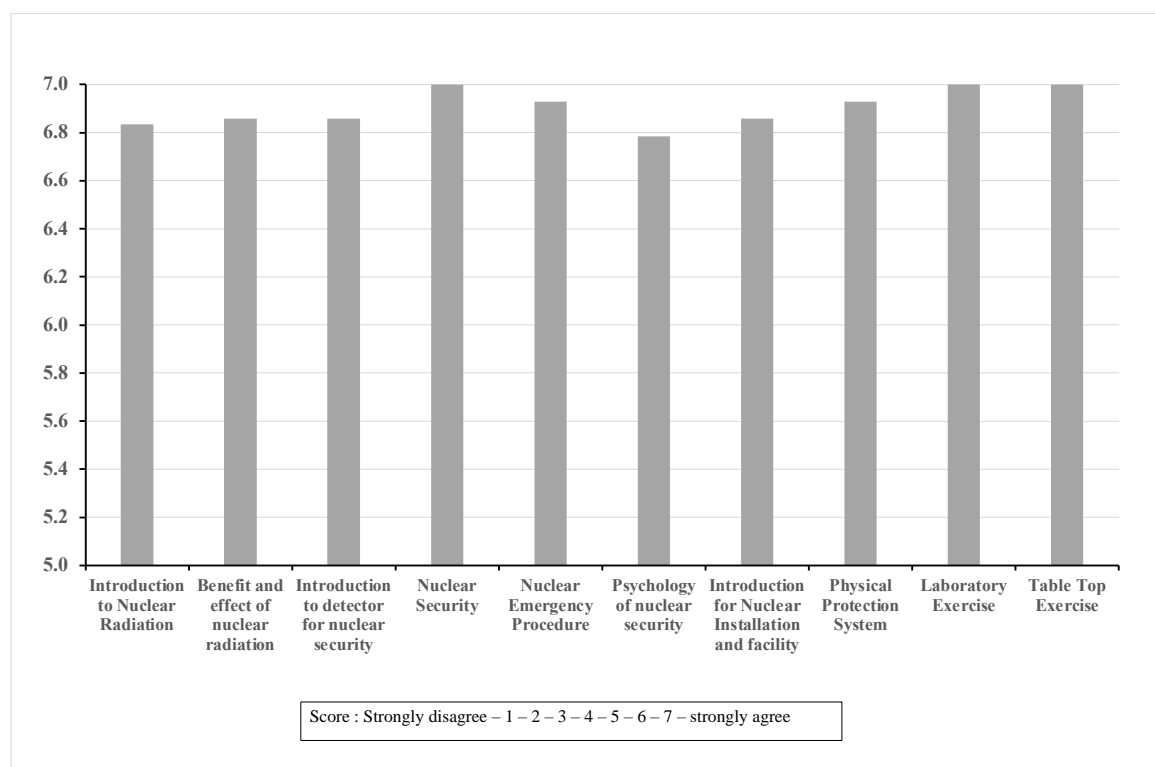


**Figure 7:** *The attractiveness of the courses*

In general, all participants agree that the training is crucial and beneficial for them, and their responses can be summed up in Figure 8. However, despite some less attractive materials, they acknowledge that the courses could meet their needs in their workplace.

The participants gave feedback through a questionnaire, and the results are summarized as the following:

1. The training should be held regularly to refresh and update the knowledge of the officers working in nuclear security-related fields.
2. There should be follow-up training on nuclear security threats and radiation sources treatment.
3. The training frequency could be added twice a year instead of once yearly.



**Figure 8: Benefit of the topics**

## 4 Conclusion

Nuclear security training to empower security officers has been held successfully. All participants from the local police (POLDA), search and rescue team (BASARNAS), and counter-terrorism agency (BNPT) have a better understanding of nuclear security issues after they finish the training. Well-prepared course topics and the active participation of the attendees during the training resulted in the enhancement of the understanding. Based on the feedback provided by the participants through the questionnaires filled out during the course, the program will be presented again in the future with the required improvements.

## 5 Declarations

### 5.1 Acknowledgements

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