

Quality Improvement Measures of Education for Radiological Emergency Preparedness

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1. Introduction

Employees of an atomic energy business operator have to take the education for radiological emergency preparedness. Korea Atomic Energy Research Institute (KAERI), designated as an educational institution by Nuclear Safety and Security Commission (NSSC), provides education and training to its employees on its own [1-2]. The education, however, has been facing several factors that hinder the effectiveness of education. Firstly, such legal education is carried out with supplier-oriented methods. Therefore, emergency staffs do not have sufficient opportunities for practical education to strengthen their required competencies. Secondly, due to the frequent personnel changes like reorganization, it is difficult to provide the education to the trainees on time.

Accordingly, this study sought ways to improve the education quality continuously as means of enhancing the radiological emergency response capabilities. Based on the concept of the IAEA's Systematic Approach to Training (SAT) [3], an education model and its feedback system were introduced to enable continuous evaluation and improvement of the training curriculum. Parallel with, a comprehensive data management system was developed for tracking the current status of the selection of emergency personnel and their education history.

2. Materials and Methods

SAT is a methodology that applies QA to training and thus assures NPP personnel competence. It consists of five interrelated phases, which are: Analysis – Design – Development – Implementation – Evaluation [3-5]. On the basis of SAT methodology, we prepared a measure to continuously improve the quality of education for radiological emergency response, as seen in figure 1.

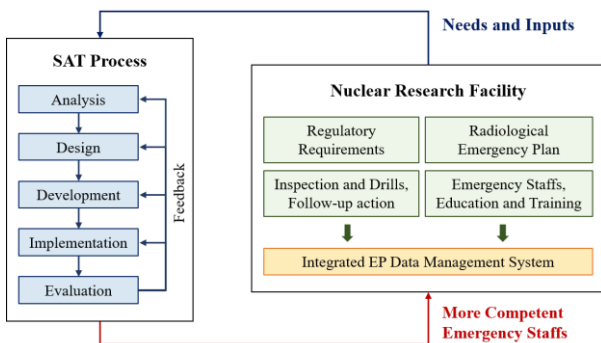


Fig. 1. Relation between SAT process and Nuclear Facility.

3. Results and Discussion

3.1 Education Model and its Feedback System

In 2020, the SAT methodology was introduced and the radiation prevention education courses were revised. Table I describes the activities, inputs, and outputs of each phase of SAT process. In the first phase, analysis of regulatory requirements, emergency organizations and missions, and previous curriculum was conducted. Then, a mid- and long-term development plan was established for the transition from theory-oriented to the practical curriculum at the design phase. In the next stage, training materials such as participatory lectures, audiovisual contents, and standard textbooks were developed based on curriculum design documents. Furthermore, a questionnaire was created to analyze educational effectiveness, which covers 5 factors and 23 attributes as listed in Table II.

Table I: Description of the Activities, Inputs, and Outputs of Each Phase of SAT

Phase	Accomplishment
Analysis	<ul style="list-style-type: none"> Emergency Organization and Duties Analysis Regulatory Requirements Analysis Previous Curriculum Analysis
Design	<ul style="list-style-type: none"> Establishment of Long-period Plan Development of Course Design Document
Development	<ul style="list-style-type: none"> Development of Training Materials <ul style="list-style-type: none"> - Participatory Lesson (2) - Learning Contents (12) - Standard Textbook (12) - Questionnaire
Implementation	<ul style="list-style-type: none"> Operation
Evaluation	<ul style="list-style-type: none"> Education Satisfaction Pre / Post Learning Achievement

Table II: Evaluation Items of Questionnaire

Factor	Attributes (5-points Likert Scale)	
Curriculum	- Expectation	- Satisfaction
	- Clarity of Education Objectives	- Understanding of the Content
	- Acquisition of Knowledge and Skill	- Contribution to Work
	- Educational Facility	- Curriculum Management
Environment	- Delivery	- Professionalism
	- Contents	- Communication
	- Teaching Plan	- Learning Methods
	- Expertise in Education Field	- Contribution to Work
	- Pre	- Post
	- Theory	- Demonstration
Learning Methods	- Practice	- Group Activity

In the implementation phase, the educational curriculum is conducted by using the developed training materials and questionnaire. At the last phase, all aspects of education programs are evaluated. This is followed by suitable feedback leading to education programs and emergency plan improvements.

3.2 Integrated EP Data Management System

The emergency preparedness (EP) data management system, a subordinate content of the Advanced Nuclear Safety Information Management (ANSIM), has been upgraded to manage the emergency preparedness data comprehensively. The ANSIM system, operating on the intranet of KAERI-Net, ensures the safety of nuclear facilities and nuclear information at KAERI. Figure 2 illustrates the configuration of the developed system.

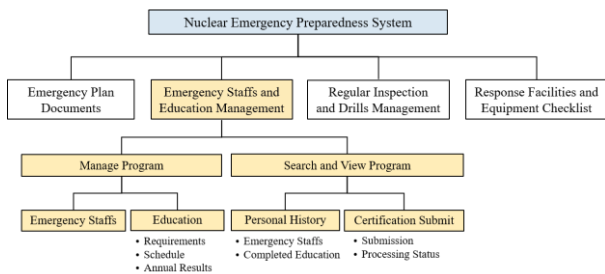


Fig. 2. Configurations of Advanced EP Management System.

The advanced management system enables to handle the EP data effectively, including the following major functions.

• Data Base Construction

- **Personnel DB:** Personnel Information, List of Emergency Staff, Selection History, Emergency Organization and Task, etc.
- **Education DB:** Requirements, Plan, Target, Current Progress, Annual Results, etc.
- **Manager DB:** E-mail Notice History, Submission and Reception Status of External Education Completion Certificate, Automatic Generation of Management Ledger (Excel Spreadsheet), Management of persons who have not completed education, etc.

• Automatic Notification E-mail

- Notice of the Selection of Emergency Personnel, Announcement of the Education Plans, etc.

• Individual Data Retrieval

- Identification of radiological emergency organization, duties, and education history linked to ANSIM login information, etc.

By establishing DB for the information related to the person in charge of emergency response and education, it is possible to prevent human error in the selection of trainees and to improve the efficiency of management tasks.

4. Conclusions

This study investigated the current issues in education for radiological emergency preparedness and suggested continuous ways to improve the education quality as means of enhancing the emergency response capabilities as follows: (1) SAT-based education model and its feedback system (2) Integrated EP data management system. The results of this study are expected to contribute to the revitalization of education and training to strengthen the radiological emergency competencies required for emergency personnel at KAERI.

5. Acknowledgments

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