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EDUCATIONAL EFFECTS OF RADIATION WORK-STUDY ACTIVITIES FOR ELEMENTARY, MIDDLE, AND HIGH SCHOOL STUDENTS

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The results of this study, suggest public communication to promote the use of radiation as follows: first, suitable information for the recipient's perception patterns should be provided, as there is a difference in risk perception and acceptance between the experts and the public. Thus, information on the necessity of nuclear power should be provided to the public, while information based on technical risks is provided by the experts. Second, since the levels of perception, knowledge, and attitudes increased highly for sectors which use radiation after the class, classes should be provided continuously to increase students' perception, knowledge, and attitude, which are all preemptive variables which induce positive behavioral changes. Third, since the seven sectors which use radiation are highly correlated, arguments for the necessity of other sectors should be based on the necessity of the medical sector.

KEYWORDS : Educational Effect, Student, School, Radiation, Communication

1. INTRODUCTION

Korea constructed Kori Nuclear Power Plant Unit 1 for nuclear power generation in 1978, and recently exported nuclear power plants to the United Arab Emirates (UAE) in 2010. Since the 1990s, the nuclear power, with its emphasis on environment-friendly growth and sustainable development, has been considered an economical, safe, and eco-friendly source of energy. It has also been an indispensable energy source which has allowed Korea, a large export-oriented country, to survive in the global community [1, 2, and 3]. As of 2012, approximately 32% of Korea's electricity is supplied by nuclear power and the country has planned to increase its proportion to 48.5% by 2024. Similarly, radiation is used in various sectors, including medicine, the agriculture industry, research, and space development. Since the enactment of the Atomic Energy Law in 1958, the number of organizations using radiation has consistently increased by 10% each year, resulting in its use by a total of 5,000 organizations as of 2012 [1, 4, 5, 6, and 7].

However, the Fukushima Daiichi nuclear accident, caused by a 9.0 magnitude earthquake in Japan in March 2011, terrorized not only Japan, but the entire world, due to radioactivity. Despite the explanations provided by the expert groups on the safety of radioactivity through mass media, the public still remains fearful [1, 2, 8, and 9] of radioactivity resulting in a gap between the public's perception and expert opinions [10]. The risks related to radioactivity are still an unfamiliar issue for the public [11, 12]. When describing risks, experts focus on the technical danger, trying to stochastically predict the degree of risk and damage. Meanwhile, the public regards risk as an experience, and experts' probabilistic results as uncertain information, which magnifies the perception of risk to an extent greater than the actual degree [13, 14].

Risk perception is defined as a concept of subjective value judgment, with risk communication based on an individual risk perception [15]. Despite the extremely low incidence rate for major accidents, when they occur they create a strong signal associated with abnormal risks with the specific technology, giving the public a negative impression and awareness which ultimately stigmatizes nuclear power [2, 6, and 16]. Since, this is a safety issue, it directly influences the society's sense of security and causes massive expenses, which greatly concerns every

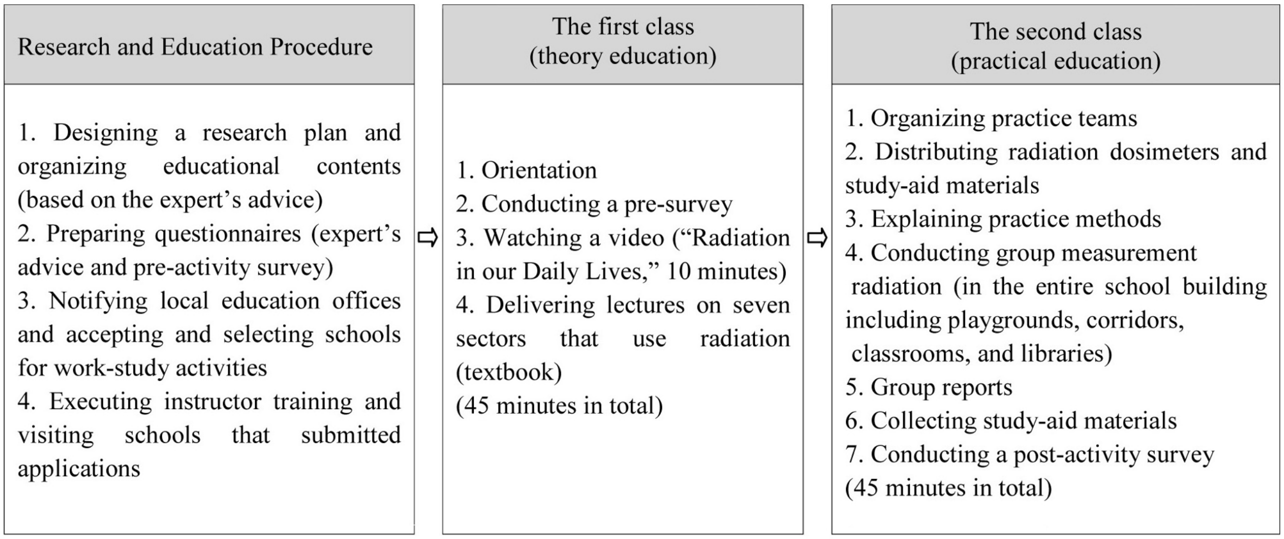

Fig. 1. Study Procedure and Curriculum Organization

member of a society, including industrial organizations [8]. Girondi (1983) and Eiser et al. (1988) explain the public's social and political support as an important element in solving energy problems, as well as the basic social, political, and technical factors that are complicatedly intertwined [17, 18].

Public understanding and acceptance should be the foundation on which radiation technology acts as an engine for the next-generation of national development and improved national competitiveness. Science and technology policies conducted without the agreement and support of the public cannot last long term. If the decision is made to accept such policies, then it aggravates social controversy and causes a lack of social support [2, 6]. Studies on the recipients' risk perceptions are actively conducted in various sectors such as health communication, environmental issues, and products and services [19]. These difficult dilemmas share common contradictions [20]. Previous domestic and international studies on problem solving and ethical dilemmas only focus on behavioral, clinical, cognitive, developmental, educational, historical, organizational, and social perspectives, with little interest paid to developing an algorithm to solving these contradictions [21, 22, and 23].

Thus, this study was designed as a communication strategy to form a wide social consensus on the use of radiation and nuclear power to improve public understanding. To provide the basic source data necessary for planning an educational-involvement strategy, radiation work-study activities were conducted with elementary, middle, and high school students - who were expected to show great educational ripple effects. Changes in the levels of their perception, knowledge, and attitude were analyzed for each sector which uses radiation.

2. METHODOLOGY

The study was conducted in this order: designing a research plan, distributing official documents for work-study activities via local education offices, selecting final participants among elementary, middle, and high schools students for work-study activities, conducting a pre-activity survey, engaging in the work-study activities (45 minutes for learning theories and 45 minutes for taking practical experiences), and conducting a post-activity survey. The work-study activities contained theory and practical training over two classes. The first class focused on theory, which included a pre-survey, watching a ten minute video on radiation in our daily lives, and lectures on seven uses of radiation in society. The second class focused on practical training, which included conducting group radiation measurements in various locations around the school, group reports, and post-activity survey as shown in Figure 1. Theory education included watching a video (10 minutes) and attending lectures (25 minutes) containing content covering seven sectors which use radiation. Practice education included a practical activity for students to measure natural radiation levels as shown in Figure 1.

2.1 Questionnaire Configuration

The teaching period was from October 17, 2012 to May 25, 2013. Trained instructors visited the targeted schools, taught classes, and conducted the surveys. Changes in the levels of perception, knowledge, and attitude on seven sectors which use radiation were analyzed through the collected questionnaires before and after the educational activities. The questionnaire consisted of questions on knowledge, attitude, and behavior, all based on a traditional