FNCA Project of Public Information
on
Nuclear Energy

Draft Report of the Joint Survey on Understanding and Interest in Radiation Among High School Students in FNCA Countries

March 2003

Japan Atomic Industrial Forum Inc.

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Joint Survey on Understanding and Interest in Radiation Among High School Students in FNCA Countries

This survey by questionnaire was designed by the Project on Public Information on Nuclear Energy, under the Forum for Nuclear Cooperation in Asia (FNCA).

Radiation and radioisotopes are used in various fields affecting people in their daily lives, but this is not well recognized by the public. For public information on radiation utilization, FNCA implemented questionnaire survey for the younger generation of high school students in order to grasp their understandings and interest of radiation and/or information sources.

This report was partially translated into English ("Comparisons of Results of Surveys in Seven Countries" only) by the Japan Atomic Industrial Forum, Inc. (JAIF), from the original report on "The Joint Survey on Understanding and Interest in Radiation Among High School Students," which was implemented in seven FNCA countries – Japan, China, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Viet Nam – in the autumn of 2002.

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Comparisons of Results of Surveys in Seven Countries

The results of the Joint Survey (questionnaire) contain some inconsistencies for procedural reasons.

Firstly, we could not do a total analysis for all countries because there was not complete data from Korea. To prepare the final version of the questionnaire, we considered comments on a preliminary (draft) questionnaire from the participating countries; however, Korea implemented the survey with the preliminary questionnaire. Because of this difference, we treat some Korean data as "reference," i.e., "Ref." in the charts.

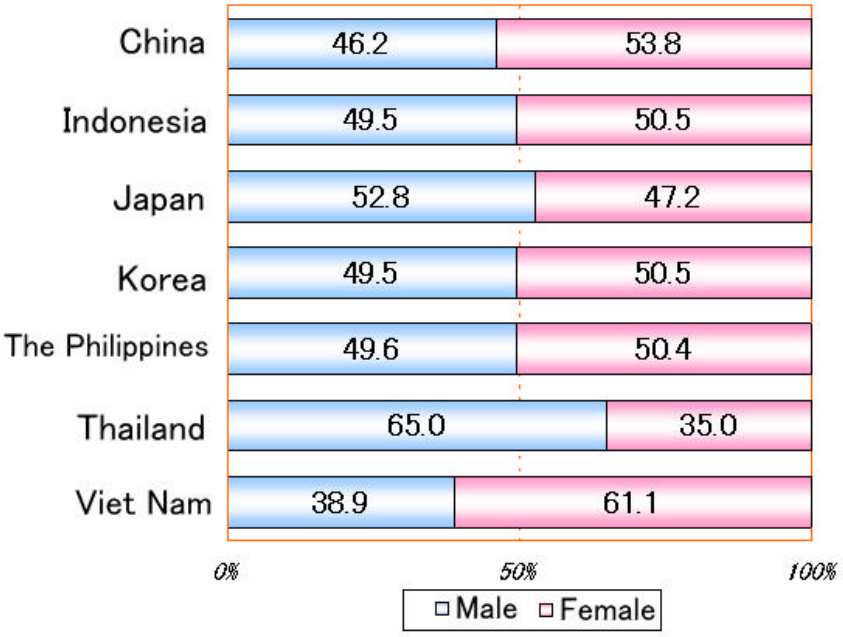
Secondly, in the section "Attributes of Respondents," Japanese data does not directly the other six countries in the choices for "Like or Dislike Science Courses: F3." The Japanese choices were "I like them," "I dislike them" and "Can't say"; for the others, they were "I like them very much," "I like them," "I dislike them" and "I strongly dislike them."

In this report, we address the "Attributes of Respondents" first, and then give arithmetic comparisons and comments for each question.

1. Attributes of Respondents

Because Project Leaders implemented the surveys using purposive selection methods (selecting students not randomly but with regard to the purposes of this survey), the results cannot be used as generalizations for high school students in any particular country.

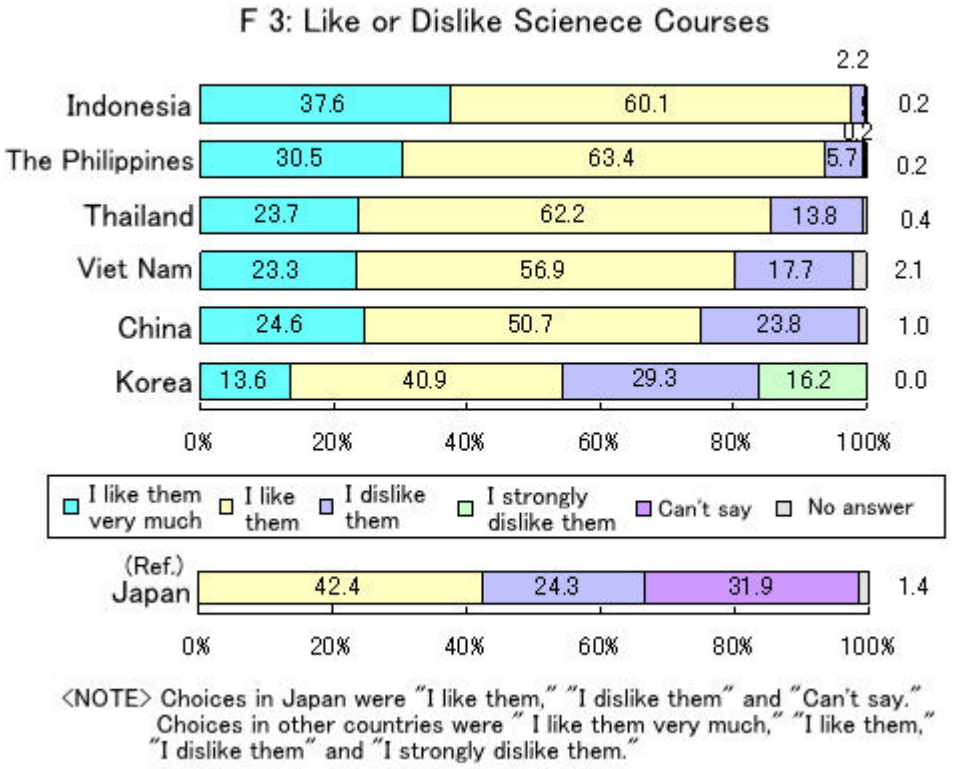
(1) Percentages of Male and Female Students (F1)



Countries Participating in the Joint Survey

Country		Project Leader	No. of Students			REMARKS (Receipt dates of answer sheets, others)
			Male	Female	Subtotal	
1		Ms. Huang Xuemei	485 (46.2%)	565 (53.8%)	1050 ＊1	Date: ～Dec. 25, 2002 Venue: 4 public schools (2 in Beijing, 1 in Zhejiang Prov. and 1 in Sichuan Prov.) (receipt of questionnaires: Dec. 25, 2002)
2	**Indonesia**	Mr. Arianto Iskandar	551 (49.5%)	562 (50.5%)	1113 ＊2	Date: Sep. 17 - 20, 2002 Venue: 10 public & 5 private schools (all in Jakarta) (receipt: Sep. 30, 2002)
3	**Japan**	Dr. Yasumasa Tanaka	610 (52.8%)	546 (47.2%)	1156 ＊3	Date: Sep.18 - Oct.9, 2002 Venue: 5 public & 3 private schools (receipt: Oct. 9, 2002)
4	**Korea**	Mr. Joon Keuk Chung	495 (49.5%)	505 (50.5%)	1000	Date: ～Oct. 15, 2002 Venue: 2 public & 3 private schools (1 in Seoul, 4 in Daejeon) <NOTE> ・Questionnaire used in Korea lacks unity with other country in some questions and choices, because it was 8.13 version (draft version). ・Cross-counting excludes Korea, because Korea counted and analyzed the survey data individually. (We received no original answer form from Korea). (receipt: Oct. 15, 2002. counting data only)
5	**The Philippines**	Mr. Edilbert A. Cabalfin	564 (49.6%)	574 (50.4%)	1138 ＊4	Date: Sep.18 - 26, 2002 Venue: 14 public & 14 private schools (all in Met. Manila) (receipt: Sep. 30, 2002)
6	**Thailand**	Mr. Pathom Yamkate	911 (65.0%)	491 (35.0%)	1402 ＊5	Date: Sep. 19 - Oct. 4, 2002 Venue: 11 public schools (6 in Bangkok) (receipt: Jan. 15, 2003)
7	**Viet Nam**	Dr. Le Chi Dung	351 (38.9%)	552 (61.1%)	903 ＊6	Date: Sep. 30, 2002 Venue: 1 public school in Hanoi (receipt: Oct. 17, 2002)
Total			3967 (51.1%)	3795 (48.9%)	7762	＊1 17 obscures in sex ＊2 6 obscures in sex ＊3 6 obscures in sex ＊4 1 obscure in sex ＊5 29 obscures in sex ＊6 16 obscures in sex
			7762 (exc. 75 obscures in sex)			

(2) Do you like science courses given in school? (F3)



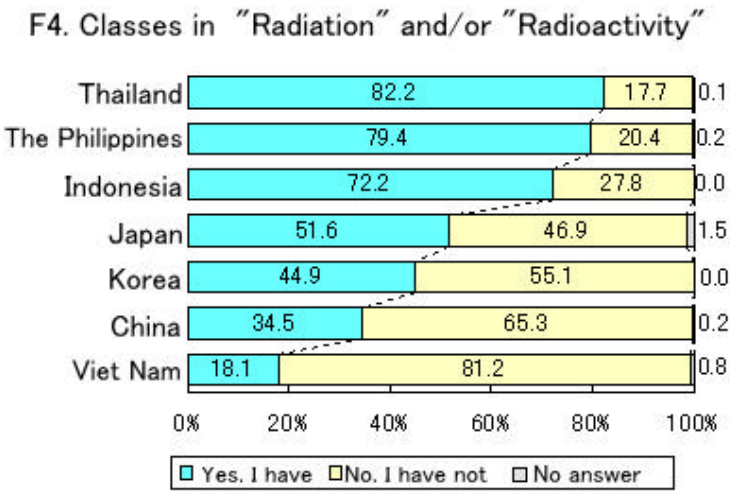
In five countries – Indonesia, the Philippines, Thailand, Viet Nam and China – more than 70% of the students answered "I like them." In Korea, more than 50% answered "I like them."

(Ref.)

In Japan a little over 40% of students answered "I like them" and a little over 30% answered, "Can't say." (Unlike in the other countries, choices in Japan were "I like them," "I dislike them" and "Can't say.")

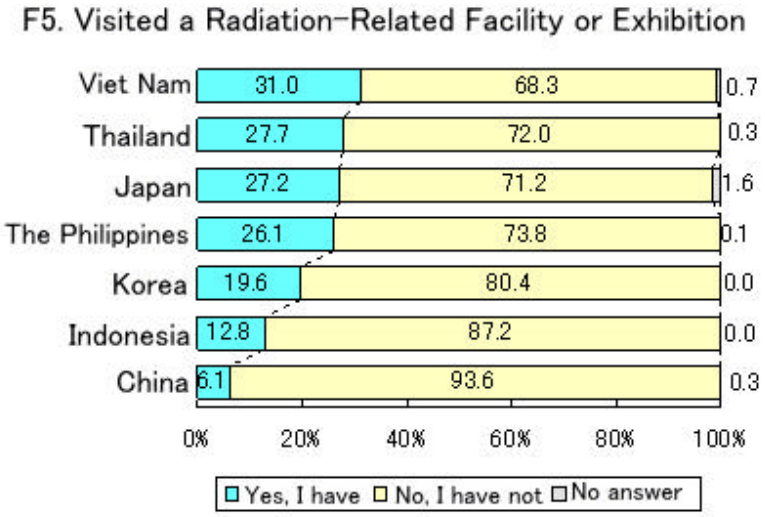
(3) Have you ever been taught about "radiation" or "radioactivity" in the past at school? (F4)

To the question "Have you ever been taught about 'radiation' or 'radioactivity' at school?" more than 70% of students answered "Yes, I have" in Thailand, the Philippines and Indonesia. The percentage answering "Yes, I have" was lowest in Viet Nam among the seven countries (less than 20%).



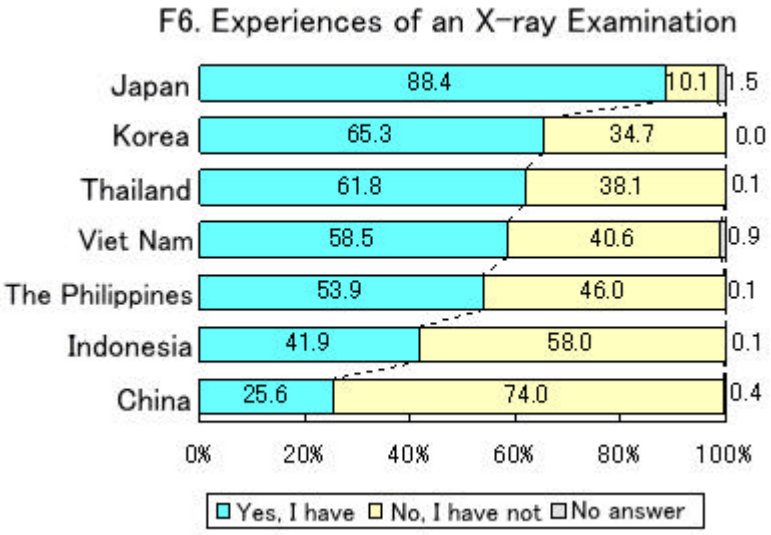
(4) Have you ever visited a university, a research institute, or a science and technology exhibition to learn about "radiation"? (F5)

To the question "Have you ever visited a university, a research institute, or science and technology exhibition to learn about 'radiation'?" more than 60% of students answered "No, I have not" in all countries. The percentage of students with experience visiting radiation-related facilities was relatively high in Viet Nam (more than 30%), and lowest in China (less than 10%).



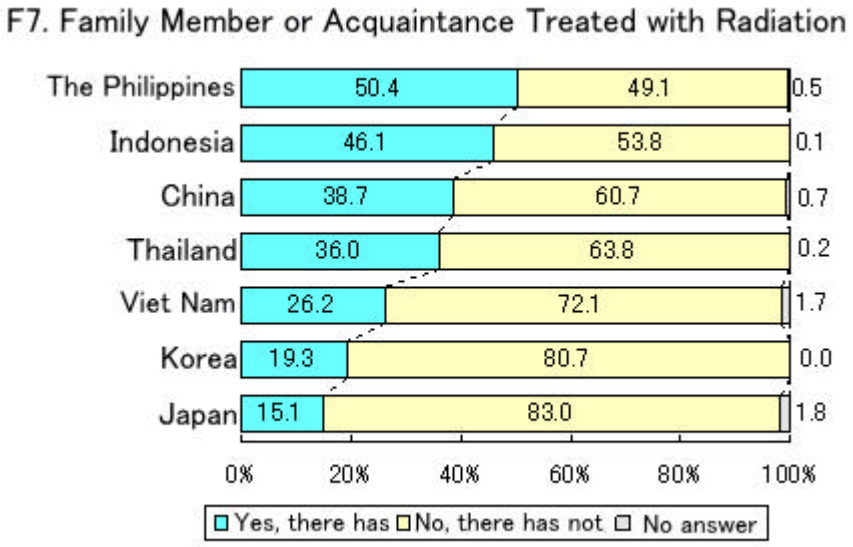
(5) Have you ever had an X-ray picture taken? (F6)

To the question "Have you ever had an X-ray picture taken?" more than 50% of students in all countries except Indonesia and China answered "Yes, I have." The percentage experiencing an X-ray examination was highest in Japan (a little less 90%) and lowest in China (less than 30%).



(6) Is there any person who received or has received medical care by radiation among your family members or acquaintances? (F7)

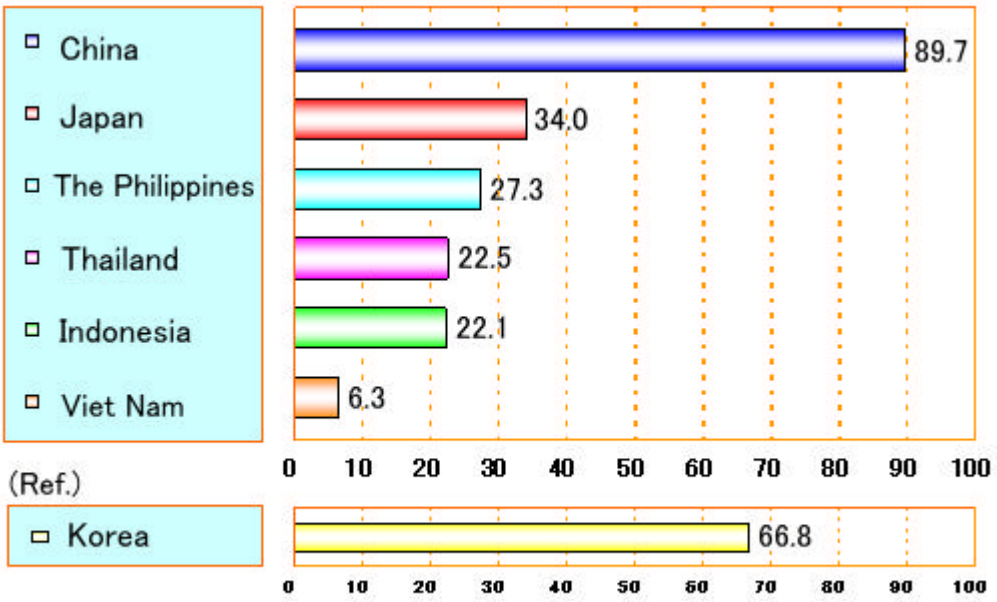
To the question "Has anyone in your family, or have any of your acquaintances, ever received medical care involving radiation?" more than 50% students in six countries except the Philippines answered "No, there has not".



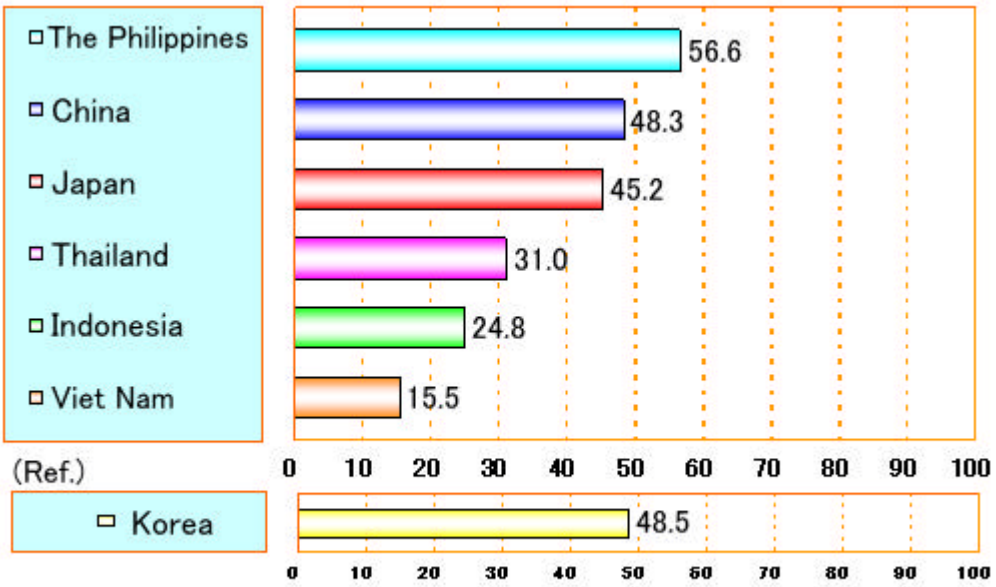
(7) Have you ever visited the following facilities? Please select as many as you like. (F8)

1 Museums
2 Zoo, Botanical Gardens, or Aquariums
3 Power Generation Plants
4 Art Museums
5 Public Libraries
6 Scientific Institutions

In this question, students were surveyed on their experience visiting "Museums," "Zoos, Botanical Gardens, or Aquariums," "Power Generation Plants," "Art Museums," "Public Libraries" and "Scientific Institutions." The percentage of students by country who had visited a power generation plant or scientific institution were as follows:



Percentage of students by country who have visited a power generation plant



Percentage of students by country who have visited Scientific Institutions

Less than 40% of students in the five countries other than China had visited a power generation plant; in contrast, in China the figure was nearly 90%. Less than 50% of students in the five countries other than the Philippines had visited a scientific institution; in the Philippines, the figure was nearly 60%.

(Ref.)

In Korea, nearly 70% and 50% of students had visited a power generation plant or scientific institution, respectively.

Revisions to choices used in Korea were as follows:
i) “Museums with Science and Technology Exhibition” was regarded as “Museums”
ii) “Zoo and Botanical Gardens” was regarded as “Zoo, Botanical Gardens, or Aquariums”
iii)”Exhibitions of Science and Technology” was regarded as “Scientific Institutions”

Data for “Natural Science Museums” and “Aquariums” were excluded because they could not be compared with other countries.

2. Questions and Answers

(1) "Which among the following issues / items are you most interested in?
Please select up to three of your highest interest."(Q1)

Q1. What High School Students are Interested in **(Ref.)**

COUNTRY / RANKING	China	Indonesia	Japan	The Philippines	Thailand	Viet Nam	Korea
1	School Life and Friends	Science and Technology	My On Future	Science and Technology	My On Future	My On Future	Science and Technology
	41.8	77.4	50.3	45.5	61.2	67.9	79.6
2	Family Life	Culture and Sports	Culture and Sports	My On Future	Science and Technology	Politics and Economics	School Life and Friends
	41.4	44.9	47.6	44.6	47.0	48.3	56.8
3	My On Future	Medical Care and Health	School Life and Friends	School Life and Friends	Energy and Environment	Science and Technology	Culture and Sports
	36.0	42.2	46.5	42.9	31.8	38.9	49.3
4	Culture and Sports	School Life and Friends	Medical Care and Health	Medical Care and Health	Medical Care and Health	Medical Care and Health	Politics and Economics
	34.7	32.0	25.3	36.3	30.0	34.3	40.1
5	Regional Dispute and Diplomatic Issues	My On Future	Science and Technology	Culture and Sports	Family Life	Culture and Sports	My On Future
	27.7	31.6	21.9	32.0	29.4	33.7	38.5
6	Medical Care and Health	Energy and Environment	Politics and Economics	Family Life	School Life and Friends	Energy and Environment	Regional Dispute and Diplomatic Issues
	24.5	29.6	20.7	24.1	29.2	24.0	32.8
7	Population and Food	Family Life	Energy and Environment	Politics and Economics	Culture and Sports	School Life and Friends	Medical Care and Health
	21.2	15.0	18.4	23.6	27.7	17.3	31.7
8	Politics and Economics	Politics and Economics	Regional Dispute and Diplomatic Issues	Energy and Environment	Politics and Economics	Family Life	Energy and Environment
	20.7	14.6	17.5	22.8	20.3	13.3	23.9
9	Science and Technology	Population and Food	Family Life	Population and Food	Population and Food	Regional Dispute and Diplomatic Issues	Population and Food
	17.0	6.4	14.7	16.6	9.7	9.7	15.7
10	Energy and Environment	Regional Dispute and Diplomatic Issues	Population and Food	Regional Dispute and Diplomatic Issues	Regional Dispute and Diplomatic Issues	Population and Food	-
	12.2	4.9	10.8	6.7	8.6	9.6	-

In the chart: Choices (above), percentage selecting (below)
*1) For Korea, "the Newest Technologies" and "Scientific Discoveries" were regarded as "Science and Technology."
*2) For Korea, "Political Issues" and "Economic Issues" were regarded as "Politics and Economics."

Students were asked to choose three items from ten choices, which they were most interested in. The top three answers were "My On Future" (five countries except Indonesia), "Science and Technology" (four countries except China and Japan) and "School Life and Friends" (three countries except Indonesia, Thailand and Viet Nam). In the Philippines in particular, those three choices were the top three selections.

(Ref.)

In Korea "Science and Technology" ranked first, followed by "School Life and Friends" and "Culture and Sports."

(2) "What are your sources of information about science and technology for example, natural phenomena, life and computers, etc.? Please select as many as you like. "(Q2)

Q2. Sources of Information on Science & Technology

COUNTRY / RANKING	China	Indonesia	Japan	The Philippines	Thailand	Viet Nam	(Ref.) Korea
1	TV&Radio	TV&Radio	TV&Radio	TV&Radio	TV&Radio	TV&Radio	TV&Radio
	82.3	92.3	84.7	87.8	86.2	95.1	74.8
2	Scientific Magazines and Books	Newspapers	Newspapers	Internet	Newspapers	Newspapers	Internet
	60.8	65.4	52.3	77.7	62.5	83.8	71.7
3	Internet	School Teacher(s)	School Textbooks	School Teacher(s)	Internet	Scientific Magazines and Books	Friends
	58.8	65.3	41.2	67.1	50.0	55.9	48.4
4	Newspapers	School Textbooks	Internet	Newspapers	School Teacher(s)	Internet	Newspapers
	58.2	59.5	40.1	61.0	39.7	50.6	32.5
5	Friends	Friends	School Teacher(s)	Scientific Magazines and Books	School Textbooks	School Teacher(s)	School Textbooks
	38.1	57.0	35.8	57.4	36.9	39.1	31.3
6	School Textbooks	Scientific Magazines and Books	Family Members (Parents and	School Textbooks	Friends	Friends	Scientific Magazines and Books
	35.4	52.4	26.2	55.4	35.3	34.9	27.2
7	Family Members (Parents and Brother/Sister)	Internet	Cartoons and Comic Books	Exhibits, Fairs, or Seminars	Scientific Magazines and Books	School Textbooks	Cartoons and Comic Books
	32.2	50.7	24.3	54.7	30.0	32.7	27.1
8	School Teacher(s)	Family Members (Parents and Brother/Sister)	Scientific Magazines and Books	Friends	Exhibits, Fairs, or Seminars	Family Members (Parents and Brother/Sister)	Family Members (Parents and Brother/Sister)
	30.6	44.9	18.3	47.3	28.8	32.7	14.4
9	Cartoons and Comic Books	Exhibits, Fairs, or Seminars	Friends	Family Members (Parents and Brother/Sister)	Family Members (Parents and Brother/Sister)	Exhibits, Fairs, or Seminars	School Teacher(s)
	18.3	39.1	15.3	45.3	27.2	29.7	11.9
10	Church, Mosque, or Temple	Church, Mosque, or Temple	Exhibits, Fairs, or Seminars	Cartoons and Comic Books	Cartoons and Comic Books	Cartoons and Comic Books	Church, Mosque, or Temple
	5.7	20.5	8.5	19.9	10.9	15.6	0.93
11	Exhibits, Fairs, or Seminars	Cartoons and Comic Books	Church, Mosque, or Temple	Church, Mosque, or Temple	Church, Mosque, or Temple	Church, Mosque, or Temple	- ※1
	2.7	18.4	1.4	14.0	1.7	3.2	-

In the chart: Choices (above), percentage selecting (below)
※1) There was no choice "Exhibits, Fairs or Seminars" for Korea.

In this question asking information source for science and technology from all eleven choices, "TV & Radio" ranked the first in all countries.

Other dominant choices ranked first three were "Newspaper" (four countries; Indonesia, Japan, Thailand and Viet Nam), "Internet" (three countries; China, the Philippines and Thailand), "School Teacher(s)" (two countries; Indonesia and the Philippines) and "Scientific Magazines and Books" (two countries; China and Viet Nam). These three choices ranked first three in the Philippines. Meanwhile ratio of "Scientific Magazines and Books" is lowest in Japan, a little less than 20%.

(Ref.)

In Korea, ratio of "Internet" was a little more than 70% ranking the second.

(3) "Following are statements about science and technology. Do you think the following information about science and technology is right or wrong? Please select one item among the three choices." (Q3)

Q3. Scientific Knowledge (Percentage of Right Answers)

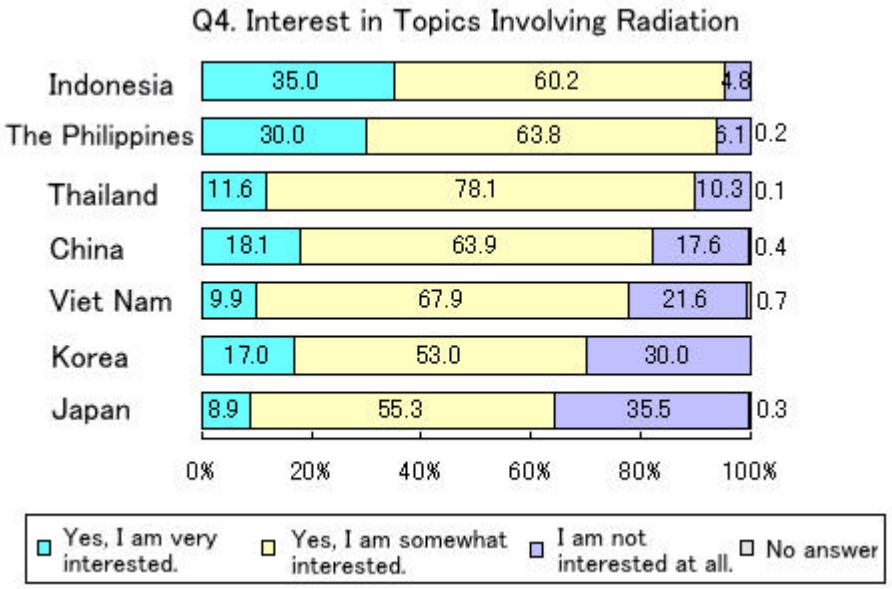
Question \ COUNTRY	China	Indonesia	Japan	Korea	The Philippines	Thailand	Vietnam	Ave.
Q3-1.The temperature at the center of the Earth is very hot (right)	81.8	89.7	88.7	77.0	82.9	79.2	86.3	83.7
Q3-2.Materials that emit radiation are all artificially made (wrong)	82.2	79.8	74.2	53.0	70.7	75.0	75.5	72.9
Q3-3.Oxygen in the air is mainly produced by photosynthesis in green plants (right)	74.6	85.4	76.9	74.0	77.7	68.3	76.9	76.3
Q3-4.A laser concentrates acoustic waves (wrong)	45.6	9.2	31.5	30.0	28.8	49.0	34.1	32.6
Q3-5.An electron is smaller than an atom (right)	58.5	59.6	71.3	34.0	68.7	73.0	63.9	61.3
Q3-6.The factor that determines the sex of a child is genes of a father (right)	54.6	34.1	31.9	47.0	26.7	50.6	65.5	44.3
Q3-7.The major reason for global warming is the release of chlorofluorocarbon gases (wrong)	59.6	34.1	43.4	29.0	34.2	19.4	47.7	38.2

(NOTE) 1) Figures in the table means ratio of right answer (%).
2) : More than 70% right answers
3) : Less than 30% right answers
4) : Highest percentage of right answers among the seven countries
5) **Ave.** : Mean value of the seven countries

In this question, scientific knowledge was tested with seven true-false questions. Three questions – Q3-1, "The temperature at the center of the Earth is very hot" (right); Q3-2, "Materials that emit radiation are all artificially made" (wrong); and Q3-3, " Oxygen in the air is mainly produced by photosynthesis in green plants" (right) – were commonly answered correctly, by more than 70% on average.

In contrast, two questions – Q3-4, "A laser concentrates acoustic waves" (wrong); and Q3-7, "The major reason for global warming is the release of chlorofluorocarbon gases" (wrong) – were answered correctly by less than 40% of students in all countries.

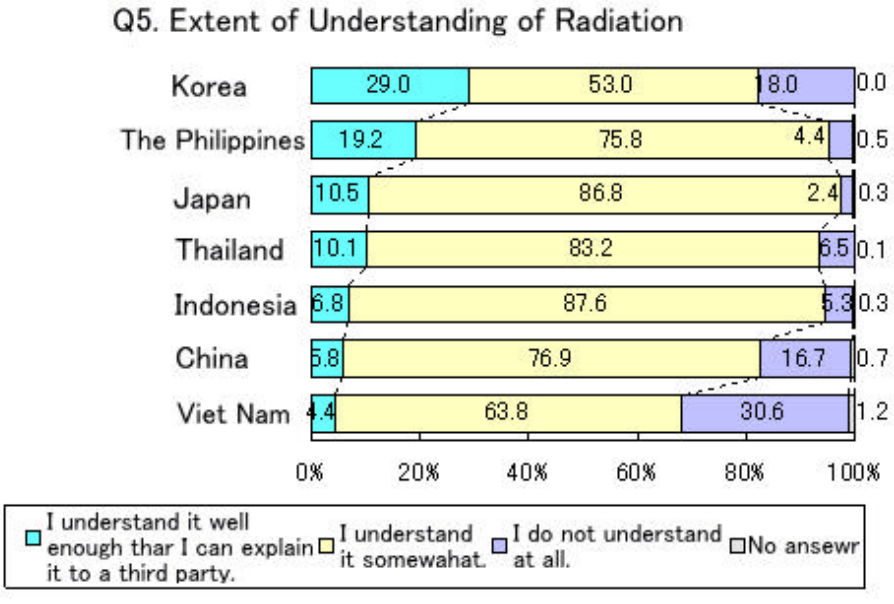
(4) "Are you interested in topics involving radiation? Please select one among the three choices."(Q4)



In this question, levels of interest among high school students in topics involving radiation were surveyed. More than 60% of students in all countries answered "Yes, I am very interested" or "Yes, I am somewhat interested."

Students in the Philippines and Indonesia had the highest interest, both as to the combination of those two positive answers, and with 30% on more answering "very interested."

(5) "To what extent do you understand the word 'radiation'? Please select one among the three choices." (Q5)



This question asked students about their level of understanding of radiation. The percentage who answered "I understand it well enough that I can explain it to a third party" was the highest in Korea at a little less than 30%, followed by the Philippines and Japan. More than 50% in all countries answered "I understand it somewhat." The combination of "well enough to explain it" and "somewhat" was the highest in Japan (97.3%), followed by the Philippines (95.0%), Indonesia (94.4%) and Thailand (93.3%). The percentage who answered "I do not understand it at all" was the highest in Viet Nam

(30.6%), followed by Korea (16.7%).

(6) "Following are statements about "radiation." Please select one answer among the five choices that best describes your opinion."(Q6)

Q6. Images of Radiation

COUNTRY / RANKING	China	Indonesia	Japan	Korea	The Philippines	Thailand	Viet Nam
1	Dangerous	Dangerous	Dangerous	Promising	Familiar	Promising	Dangerous
	81.6 (58.7)	84.7 (62.7)	87.2 (65.1)	72.0 (12.0)	84.6 (48.1)	88.6 (68.6)	93.8 (61.5)
2	Promising	Useful	Useful	Dangerous	Dangerous	Dangerous	Useful
	72.9 (52.2)	81.7 (63.8)	57.6 (27.0)	71.0 (28.0)	83.7 (55.6)	86.1 (65.1)	87.7 (9.6)
3	Useful	Familiar	Promising	Useful	Useful	Useful	Promising
	70.4 (50.2)	70.1 (48.3)	48.0 (23.8)	68.0 (23.0)	78.8 (34.6)	85.2 (53.9)	76.1 (52.3)
4	Controllable	Controllable	Mysterious	Mysterious	Promising	Controllable	Controllable
	54.5 (27.8)	51.8 (28.8)	43.6 (19.7)	67.0 (20.0)	54.3 (16.3)	58.6 (25.9)	75.0 (34.4)
5	Familiar	Mysterious	Weird	Controllable	Mysterious	Familiar	Weird
	43.5 (15.6)	47.2 (29.4)	41.5 (18.4)	65.0 (11.0)	52.6 (26.4)	44.7 (9.8)	64.9 (41.0)
6	Mysterious	Promising	Familiar	Familiar	Controllable	Mysterious	Familiar
	39.8 (15.1)	38.8 (16.0)	26.4 (9.9)	60.0 (28.0)	49.6 (19.5)	41.4 (15.5)	52.4 (22.9)
7	Weird	Weird	Controllable	Weird	Weird	Weird	Mysterious
	29.7 (12.5)	34.8 (16.3)	21.7 (7.5)	50.0 (8.0)	29.5 (10.8)	39.4 (19.0)	36.0 (17.8)

(NOTES) 1) In the chart: Choice (above); percentage selecting (below)
2) Figures show the sum of "Yes, I agree" and "I somewhat agree. "
3) Figures in parentheses are for "Yes, I agree."

In this question, high school students' images/impressions of radiation were surveyed. Among seven choices, "Dangerous", "Useful" and "Promising" were selected relatively frequently. "Dangerous" and "Useful" ranked within top three in all countries, as did "Promising" in all countries except Indonesia and the Philippines.

"Dangerous" was selected by more than 70% in all countries (sum of "Yes, I agree" and "I somewhat agree").

"Useful" (sum of "Yes, I agree" and "I somewhat agree") was selected most in Viet Nam (87.7%), followed by Thailand (85.2%).

"Promising" (sum of "Yes, I agree" and "I somewhat agree") was selected most in Thailand (88.6%) and least in Indonesia (38.8%).

"Controllable" (sum of "Yes, I agree" and "I somewhat agree") was selected most in Viet Nam (75.0%).

(7) "What do you imagine when you hear the word "radiation"? Please select as many as you like." (Q7)

Q7. What the word "Radiation" Brings to Mind

COUNTRY / RANKING	China	Indonesia	Japan	The Philippines	Thailand	Viet Nam	(Ref.) Korea
1	Mr. and Mrs. Curie	An X-ray Picture	Nuclear Power Generation	Nuclear Power Generation	An X-ray Picture	Cancer Therapy	Hiroshima, Nagasaki or Nuclear Weapons
	81.4	81.6	77.8	82.4	87.3	81.6	80.0
2	An X-ray Picture	Nuclear Power Generation	An X-ray Picture	An X-ray Picture	Cancer Therapy	Hiroshima, Nagasaki or Nuclear Weapons	Cancer Therapy
	69.0	75.7	75.6	76.1	66.4	80.6	57.0
3	Mutation Breeding of Crops	Hiroshima, Nagasaki or Nuclear Weapons	Hiroshima, Nagasaki or Nuclear Weapons	Hiroshima, Nagasaki or Nuclear Weapons	Nuclear Power Generation	Exposure	An X-ray Picture
	53.4	74.8	74.8	69.9	65.3	79.5	50.0
4	Hiroshima, Nagasaki or Nuclear Weapons	Cancer Therapy	Exposure	Cancer Therapy	Hiroshima, Nagasaki or Nuclear Weapons	An X-ray Picture	Food Irradiation
	52.1	60.6	71.0	66.0	57.6	78.2	40.8
5	Chernobyl	Mr. and Mrs. Curie	Chernobyl	Exposure	Waste	Nuclear Power Generation	Waste
	50.3	38.8	58.0	60.8	54.7	74.0	35.2
6	Leukemia	Mutation Breeding of Crops	Cancer Therapy	Mutation Breeding of Crops	Food Irradiation	Mutation Breeding of Crops	Chernobyl
	41.0	33.8	42.2	33.7	51.8	71.1	34.2
7	Nuclear Power Generation	Waste	Waste	Waste	Exposure	Mr. and Mrs. Curie	Mutation Breeding of Crops
	31.1	31.0	31.4	31.3	50.2	66.9	32.8
8	Waste	Food Irradiation	Leukemia	Leukemia	Mr. and Mrs. Curie	Food Irradiation	Mr. and Mrs. Curie
	23.4	24.7	26.8	26.6	34.9	52.4	32.5
9	Exposure	Leukemia	Mr. and Mrs. Curie	Mr. and Mrs. Curie	Mutation Breeding of Crops	Chernobyl	Nuclear Power Generation
	19.6	18.1	21.6	25.0	23.7	49.3	28.0
10	Cancer Therapy	Chernobyl	Mutation Breeding of Crops	Food Irradiation	Leukemia	Leukemia	Leukemia
	14.7	14.1	8.5	24.1	20.8	34.8	12.3
11	Food Irradiation	Exposure	Food Irradiation	Chernobyl	Chernobyl	Waste	Exposure
	7.4	3.1	8.0	23.2	17.4	26.4	4.3

(NOTES) In the chart: Choices (above); percentage selecting (below). Choices used in Korea included "hotsprings," "JCO", "ultraviolet rays," "Cobalt 60" and "Technology," all omitted from this chart.

This question concerned what the word "radiation" brings to mind. Among eleven choices, "An X-ray Picture" (except Viet Nam), "Nuclear Power Generation" (except China and Viet Nam) and "Hiroshima, Nagasaki or Nuclear Weapons" (except China and Thailand) ranked within the top three in all countries.

In China, which, like Japan, has operating nuclear power plants, less than 30% of students were reminded of "Nuclear Power Generation," while a little less than 80% of Japanese students were. Although there are no nuclear power plants in the Philippines, a little over 80% of Philippine students responded to "Nuclear Power Generation," the highest figure among all the

countries.

In Japan, a little over 40% of the students were reminded of "Cancer Therapy." Except for Japan and China (less than 20%), the figure exceeded 60% in all countries.

"Mutation Breeding of Crops" got the lowest response (less than 10%) in Japan, while other countries were above 20%. "Food Irradiation," another utilization in agriculture, scored less than 10% in China and Japan. In other countries it exceeded 20%, and exceeded 50% in Thailand and Viet Nam.

(Ref.)

In Korea, a nuclear generating country, over 80% of the students answered "Hiroshima, Nagasaki or Nuclear Weapons," the highest among all the countries, while a little less than 30% (ninth ranking) answered "Nuclear Power Generation."

(7) "The following are some statement about "radiation." Please select one that best meets your own idea." (Q8)

Q8. Knowledge of Radiation

Percentage of Right Answers (%)

ITEMS \ COUNTRY	China	Indonesia	Japan	Korea	The Philippines	Thailand	Viet Nam	Ave.
Q8-1.Materials that emit radiation have existed in nature since the creation of the Earth (right)	68.2	80.8	62.7	35.0	60.7	53.9	74.4	62.2
Q8-2.Intensity of emitted radiation will not change as time passes (wrong)	60.2	46.1	64.2	49.0	68.3	62.0	51.9	57.4
Q8-3.Radiation is also emitted from ordinary food even it is extremely low level (right)	31.1	28.9	49.0	36.0	50.4	39.7	19.9	36.4
Q8-4.Direction of radiation beams can be changed by strong winds (wrong)	34.9	34.7	50.3	49.0	56.7	54.9	54.3	47.8
Q8-5.Characteristics of natural radiation and artificial radiation are different (wrong)	19.7	8.4	19.3	49.0	19.8	22.0	23.4	23.1
Q8-6.The human body always emits radiation, but the radiation emitted is extremely low level only (right)	52.4	53.8	41.9	11.0	56.1	52.3	51.5	45.6

(NOTES) 1) Figures in the chart show the percentage of right answers (%).
2) ▭ : More than 70% right answers
3) ▭ : Less than 30% right answers.
4) ⬭ : Highest percentage of right answers among the seven countries.
5) Ave. : Mean value of the seven countries.

In this true-false section, high school students' knowledge of radiation itself was surveyed with six questions. Correct answers exceeded 50% in all countries except Korea for "Materials that emit radiation have existed in nature since the creation of the Earth" and exceeded 40% in all countries for "Intensity of emitted radiation will not change as time passes." On average, right answers to both questions exceeded 50% in all countries.

Regarding the question "Characteristics of natural radiation and artificial radiation are different" (wrong), the percentage of right answers was below 30% in all countries except Korea (a little less than 50%).

(9) "Radiation is used for various applications worldwide. Please let us know your knowledge about the following applications of radiation by selecting one among the four choices." (Q9)

Q9. Recognition of Applications of Radiation

ITEM \ COUNTRY	China	Indonesia	Japan	Korea	The Philippines	Thailand	Viet Nam
Q9-1.Mutation breeding of rice, wheat, soybean, flower, etc.	34.2	25.9	21.3	73.0	48.8	46.7	50.8
Q9-2.Examination of health conditions and function of organs of human beings	63.8	66.8	72.0	79.0	83.3	76.5	72.0
Q9-3.Decomposition and removal of air pollutants from exhaust gases of industrial	36.7	14.1	18.2	47.0	49.4	26.0	33.0
Q9-4.Retardation (Delay) of sprouting of potatoes, onions, and garlic	18.7	35.1	20.7	24.0	40.4	36.9	39.1
Q9-5.Cancer therapy	52.6	54.1	68.2	66.0	72.8	74.7	75.6
Q9-6.Sterilization of medical supplies like syringes	44.7	31.3	23.4	55.0	47.6	46.9	39.2
Q9-7.Baggage inspection at airports	55.0	34.9	57.0	56.0	74.6	68.7	55.5
Q9-8.Prevention of damage to crops and domestic animals by sterilizing harmful insects	25.9	32.2	14.1	46.0	45.7	35.0	27.2
Q9-9.Measurement of thickness of iron plates in iron factories	16.6	18.5	11.7	48.0	30.3	35.7	21.7
Q9-10.Nondestructive examination of statues and paintings of cultural value	23.2	18.9	33.8	44.0	34.8	40.5	39.6
Q9-11.Microanalysis of harmful pollutants in the air	24.7	14.9	23.5	44.0	45.0	25.7	28.6
Q9-12.Production of heat-resistant insulation for electric wires	16.7	15.7	10.2	55.0	46.8	24.3	21.7

(NOTE) 1) Figures in the chart show the sum of "I know well" and "I know to some extent."
2) : Exceeds 70%
3) : Less than 30%.
4) : Highest among the countries.

In this question, students were asked for their recognition of radiation utilization on a four-point scale for twelve actual examples. The answer "I know well" or "I know to some extent" was given by more than 60% for "Examination of health conditions and function of organs of human beings" and by more than 50% for "Cancer therapy" by students in all countries. "Baggage inspection at airports" was also relatively highly recognized in all countries, particularly in the Philippines and Thailand.

Overall, recognition was relatively high in both Korea and the Philippines. In China and Indonesia it was less than 30% for six of the twelve actual examples. Japan was especially low: less than 30% for eight actual examples.

After the Philippines, students' recognition was relatively high and balanced for all actual examples in Thailand and Viet Nam.

(10) "Please see Figure 1 on the attached sheet.

i) Which logo is internationally used to indicate that food was treated by radiation? Please select one among the four logos.

ii) Which logo is the radiation warning symbol that is used internationally in indicating existence of materials that emit radiation? Please select one among the four logos."

Visual Question (Fig.1)

1 2 3 4

Q10. Visual Question: Radiation Logos

Percentage of right answers

QUESTION \ COUNTRY	China	Indonesia	Japan	The Philippines	Thailand	Viet Nam	Ave.	(Ref.) Korea
Q10-i).Which logo is internationally used to indicate that food was treated by radiation? (right answer: 3)	37.5	43.8	46.8	44.4	52.0	45.4	50.0	29.0
Q10-ii).Which logo is the radiation warning symbol that is used internationally in indicating existence of materials that emit radiation? (right answer: 2)	13.5	63.6	61.9	64.4	71.3	49.3	54.0	—

(NOTE) 1) Figures in the chart show the percentage of right answers (%)
2) : Exceeds 70%
3) : Less than 30%
4) : Highest among the countries
5) Ave. :Mean value of the seven countries.
6) Q10-ii was excluded in Korean survey.

Except in Thailand, the percentage of right answers to the first question, "Which logo is internationally used to indicate that food was treated by radiation?" was less than 50% in all countries.

The percentage of right answers to the second question, "Which logo is the radiation warning symbol that is used internationally to indicate the presence of materials that emit radiation?" exceeded the average in Thailand (71.3%), the Philippines (64.4%), Indonesia (63.6%) and Japan (61.9%). In China, only 13.5% answered it correctly, and half of the students gave no answer.

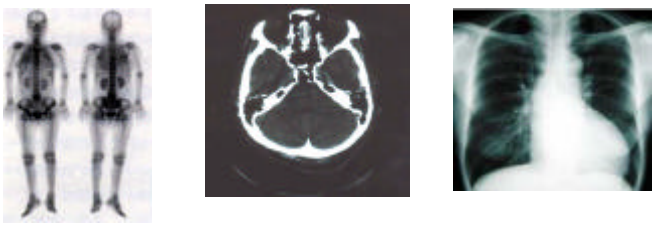
(11) Please see Figure 2 on the attached sheet. These are outputs that show applications of "radiation" in the medical field. Please select one picture for each item that best describes items (i) or (ii) as follows:

i) Diagnostic image taken by putting materials that emit Radiation

ii) Image by X-Ray Computed Tomography (CT)

Visual Question (Fig.2)

1 2 3



Q11. Visual Question: Medical Applications of Radiation

Percentage of right answers (%)

QUESTION \ COUNTRY	China	Indonesia	Japan	Korea	The Philippine	Thailand	Viet Nam	Ave.
Q11- i .Diagnostic image taken by putting materials that emit Radiation (right answer:b 1)	30.8	18.3	23.4	25.0	29.7	23.1	30.0	25.8
Q11- ii.Image by X-Ray Computed Tomography (CT) (right answer: 2)	37.2	29.3	51.9	73.0	32.4	22.0	24.5	38.6

(NOTES) 1)Figures in the chart show the percentage of right answers (%)
2) : Exceeds 70%
3) : Less than 30%
4) : Highest among the countries
5) Ave. : Mean value of the seven countries.

The right answer for "Diagnostic image taken by putting materials that emit Radiation" was given by less than 30% of the students in all countries.

The right answer for "Image by X-Ray Computed Tomography (CT)" was given by the highest percentage of students in Korea (a little over 70%).

Overall, the percentage giving the right answer was higher for the latter question than for the former, but cannot be considered "high" in either case.

(12) "What do you want to know about "radiation"? Please select as many as you like." (Q12)

1 Amount of radiation exposure that may affect health of human beings
2 Safety measures in managing radiation exposure
3 Emergency preparedness in radiation-related accidents
4 Facilities that are using radiation
5 Application in food
6 Mutation breeding of crops
7 Applications in industry
8 Applications in the field of medicine
9 Regulation by the government
10 The most advanced fields of research
11 Nothing in particular

Q12. What High School Students Want to Know about Radiation

COUNTRY / RANKING	China	Indonesia	Japan	Korea	The Philippines	Thailand	Viet Nam
1	Amount of radiation exposure	Amount of radiation exposure	Emergency preparedness	Medical Applications	Amount of radiation exposure	Amount of radiation exposure	Amount of radiation exposure
	74.7	81.0	56.7	78.8	82.9	70.7	89.1
2	Medical Applications	Medical Applications	Safety measures	Amount of radiation exposure	Safety measures	Medical Applications	Emergency preparedness
	57.2	75.2	55.9	77.2	71.7	62.8	73.0
3	Advanced fields of research	Emergency preparedness	Amount of radiation exposure	Application in food	Medical Applications	Application in food	Medical Applications
	55.6	73.8	48.9	65.0	67.0	54.1	70.5
4	Emergency preparedness	Radiation Facilities	Medical Applications	Emergency preparedness	Radiation Facilities	Safety measures	Safety measures
	52.8	67.6	44.5	62.0	64.7	52.6	63.7
5	Safety measures	Application in food	Advanced fields of research	Regulation	Emergency preparedness	Emergency preparedness	Advanced fields of research
	48.9	66.8	36.1	61.3	61.3	48.1	63.1
6	Radiation Facilities	Advanced fields of research	Application in food	Advanced fields of research	Application in food	Radiation Facilities	Application in food
	48.0	64.3	33.7	58.3	59.6	45.2	58.8
7	Application in food	Safety measures	Radiation Facilities	Safety measures	Advanced fields of	Applications in industry	Applications in industry
	41.3	64.0	33.2	46.7	59.4	45.6	54.8
8	Mutation breeding	Applications in industry	Regulation	Mutation breeding	Applications in industry	Regulation	Mutation breeding
	35.6	52.9	26.6	44.4	51.8	40.7	48.3
9	Applications in industry	Mutation breeding	Mutation breeding	Applications in industry	Mutation breeding	Mutation breeding	Radiation Facilities
	35.0	47.3	19.6	40.8	47.0	34.2	38.9
10	Regulation	Regulation	Applications in industry	Radiation Facilities	Regulation	Advanced fields of	Regulation
	26.3	27.9	18.4	35.3	37.3	31.8	38.1

(NOTES) 1) In the chart: Choices (above); percentage selecting (below).
2) "Nothing in particular" ranked eleventh in all countries (omitted from this chart).

This question sought to ascertain what high school students want to know about radiation. Among eleven choices (including "Nothing in particular"), "Amount of radiation exposure that may affect health of human beings" (all countries), "Applications in the field of medicine" (except Japan) and "Emergency preparedness in radiation-related accidents" (Indonesia, Japan and Viet Nam) ranked within the top three in all countries.

In China, the percentage of students who selected "The most advanced fields of research" was relatively high (a little less than 60%).

"Mutation breeding of crops" was a low choice in all countries, particularly Japan (less than 20%).

In Indonesia and the Philippines, eight choices were selected by more than 50% of the students, showing a high level of overall interest on the part of the students. In contrast, only two choices were selected by more than 50% of the students in Japan, reflecting a low level of interest.

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