Summary

The 2001 Survey of Public Attitudes Toward and Understanding of Science & Technology in Japan

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National Institute of Science and Technology Policy
Ministry of Education, Culture, Sports, Science and Technology

Preface

The National Institute of Science and Technology Policy conducted a Survey of Public Attitudes Toward and Understanding of Science & Technology among 3000 people in February and March 2001 to examine the general public's level of interest in, understanding of, and attitudes toward science and technology (S&T). This report presents the results of chronological comparisons, international comparisons, and multivariate analyses that were obtainable from the available data.

Main Objectives of the Survey

- Collect the most recent data on the general public's attitudes toward S&T.
- Identify the general public's attitudes toward S&T in Japan through comprehensive analysis using statistical methods.
- Collect data to be used as basic materials for the Third-term Science and Technology Basic Plan.
- Study on standardized questionnaires and methods of survey analysis for future surveys

Survey Outline

- Dates: February 23 to March 23, 2001
- Subjects:
  (1) Designed samples: 3,000
  (Valid responses: 2,146 or 71.5%)
  (2) Target population:
  Men and women between aged 18 or over from all over Japan.
  (3) Sampling method:
  Two-stage stratified random sampling from the Basic Resident Registers.
- Survey method: Interviews conducted by surveyors (face-to-face interviews)
- Survey content: Based on the survey of public attitudes towards S&T conducted by the U.S. in 1999 to facilitate international comparisons.

Outline of Survey Analysis Results

- Responses indicated that the level of interest in, sense of being well informed about*, and public attentiveness* to S&T were generally low compared to other topics such as the economic and business issues, with the exception of the topic of "environmental pollution." This trend was especially noticeable in the sense of being well informed about S&T issues (Fig. 1, Fig 6).

  An international comparison among 15 countries shows that Japan has the lowest level of interest in S&T topics, with the exception of environmental pollution (Fig. 2, Fig.3, Fig 4, Fig.5, Fig.6).

- In an international comparison among 15 countries*, Japan had a lower level of understanding (literacy) of S&T knowledge than the US and several European countries (Fig. 7, Fig.8, Table 1).

  The level of understanding of S&T terminology has improved over past surveys, but more detailed surveys of the specific content and level of that knowledge are needed.

- Attitudes toward S&T are predominantly positive. The majority of respondents think that the benefits of scientific research outweigh the harmful results, but are concerned about the harmfulness of genetically modified foods (Fig. 9, Fig.10, Fig.11).

  Respondents indicated a relatively high level of support for government expenditures on scientific research (Fig. 12).

- The most common sources of S&T information are television and newspapers. An extremely low percentage of people read S&T magazines and few reported visits to public facilities related to S&T (Fig. 13, Fig.14, Table 2).

- Responses regarding the level of name recognition of the government activities that promote the understanding of S&T showed that there is a high level of recognition of RoboFesta and Science and Technology Week.

  Respondents feel that government officials, researchers, and educators need to step up their efforts to promote the understanding of S&T among the general public, and that the accurate reporting of information by the mass media and education system reforms lead to an accurate understanding of research (Fig. 15,Fig.16, Fig.17, Fig.18, Fig.19).

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sense of being well informed*: A person's self-rated sense of how well informed they feel about a certain issue.

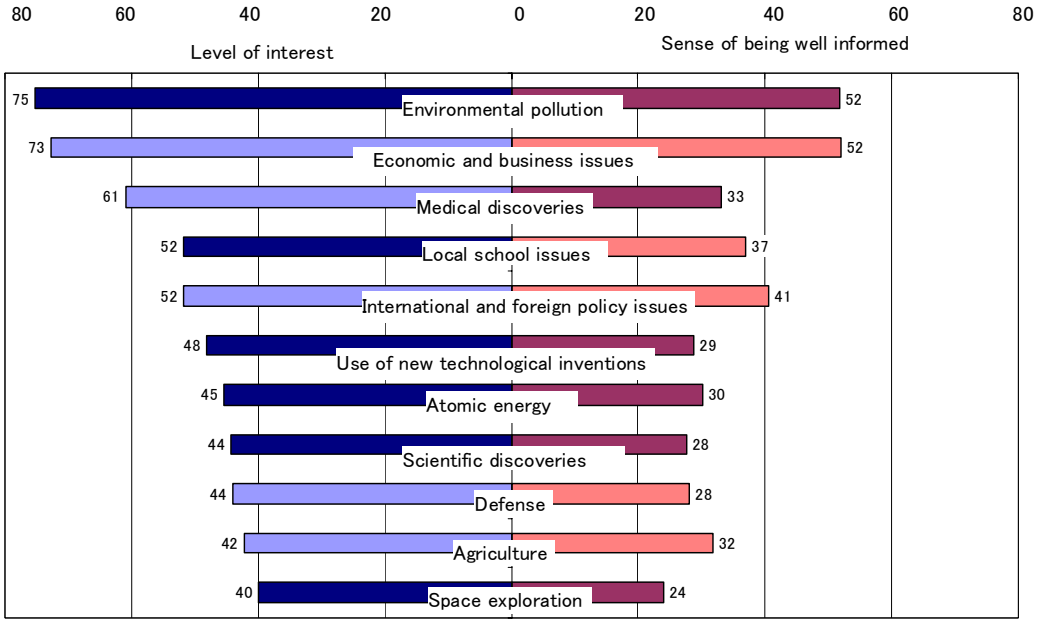
public attentiveness*: Integrated indicator of level of interest, sense of being well informed, and frequency of newspaper reading.

15 countries*: Includes the EU countries, the US, Canada, and the EU as a region (all of which have comparable data).

Level of Interest and Sense of Being Well Informed

Reported levels of interest and sense of being well informed (a person's self-rated sense of how well informed they feel about a certain issue) were generally low for S&T topics, as compared to other issues such as economic and business issues with the exception of environmental pollution. This was especially noticeable in the sense of being well informed.

Fig. 1 Level of interest in and sense of being well informed of various issues (comparison of index scores*)



Index Score*

Index scores were calculated by assigning a value of 100 for a "very interested" (level of interest) or "well informed" (sense of being well informed) response × 100 points, a value of 50 for a "moderately interested" or "moderately informed" response, and a value of 0 for a "not at all interested" /"not at all informed" or "I don't know" response.

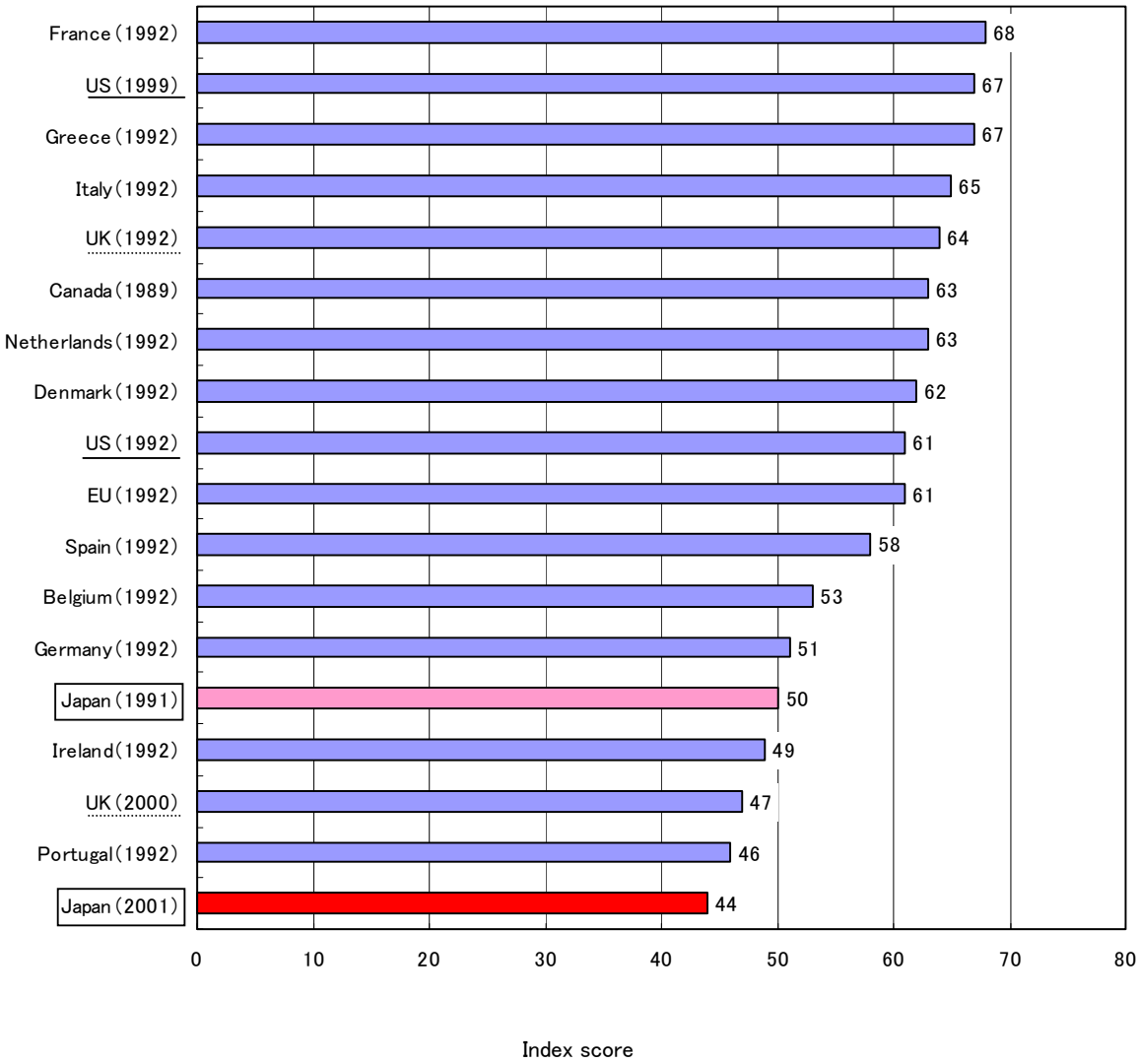
The Japanese survey conducted in 1991 had four levels of answers, such that calculations were made by multiplying by 100, 67, 33, and 0.

The "sense of being well informed" expresses a person's self-rated sense of how well informed they feel about a certain issue.

International Comparison of Index Scores for Level of Interest in "Scientific Discoveries"

Scores fell in Japan between 1991 and 2001, rose in the US between 1992 and 1999, and fell in the U.K. between 1992 and 2000. Data is only available for the EU from1992 and for Canada from 1989.

Fig. 2 International comparison among 15 countries of index scores for level of interest in "scientific discoveries"

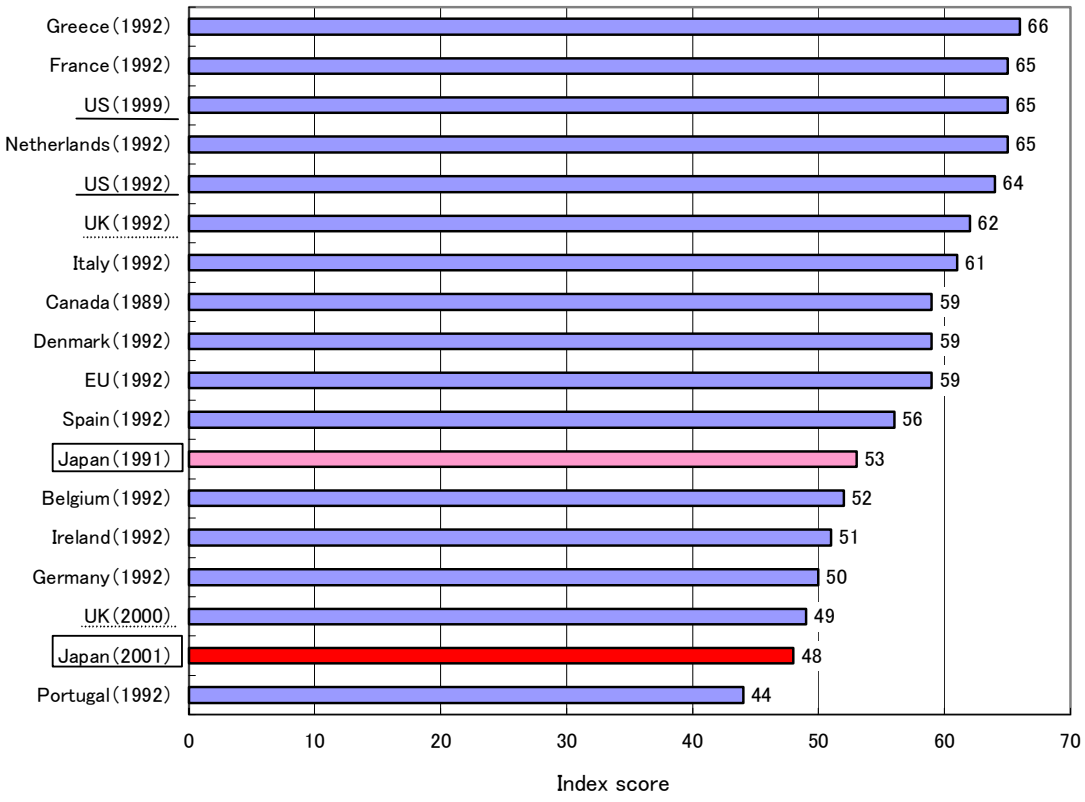


The index score is calculated based on the percentages of respondents who characterized their level of interest in "issues about new scientific discoveries" as "very interested," "moderately interested," and "not at all interested."

International Comparison of Index Scores for Level of Interest in the "Use of New Technological Inventions"

Scores fell in Japan between 1991 and 2001, were about the same in the US in 1992 and 1999, and fell in the U.K. between 1992 and 2000. Data is only available for the EU from 1992 and for Canada from 1989.

Fig. 3 International comparison among 15 countries of index scores for level of interest in "use of new technological inventions"

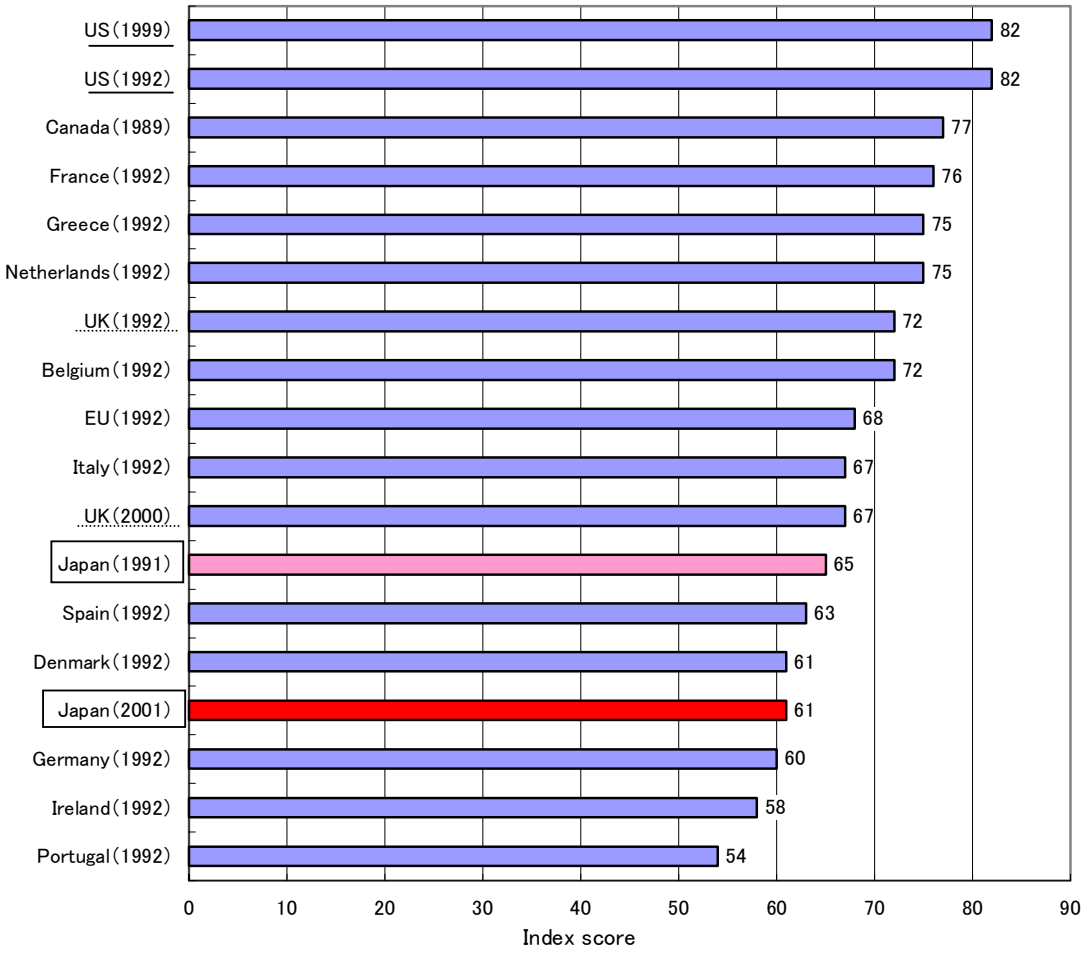


The index score is calculated based on the percentages of respondents who characterized their level of interest in the "use of new technological inventions" as "very interested," "moderately interested," and "not at all interested."

International Comparison of Index Scores for Level of Interest in "Medical Discoveries"

Scores fell in Japan between 1991 and 2001, were about the same in the US in 1992 and 1999, and fell in the U.K. between 1992 and 2000. Data is only available for the EU from 1992 and for Canada from 1989.

Fig. 4 International comparison among 15 countries of index scores for level of interest in "medical discoveries"

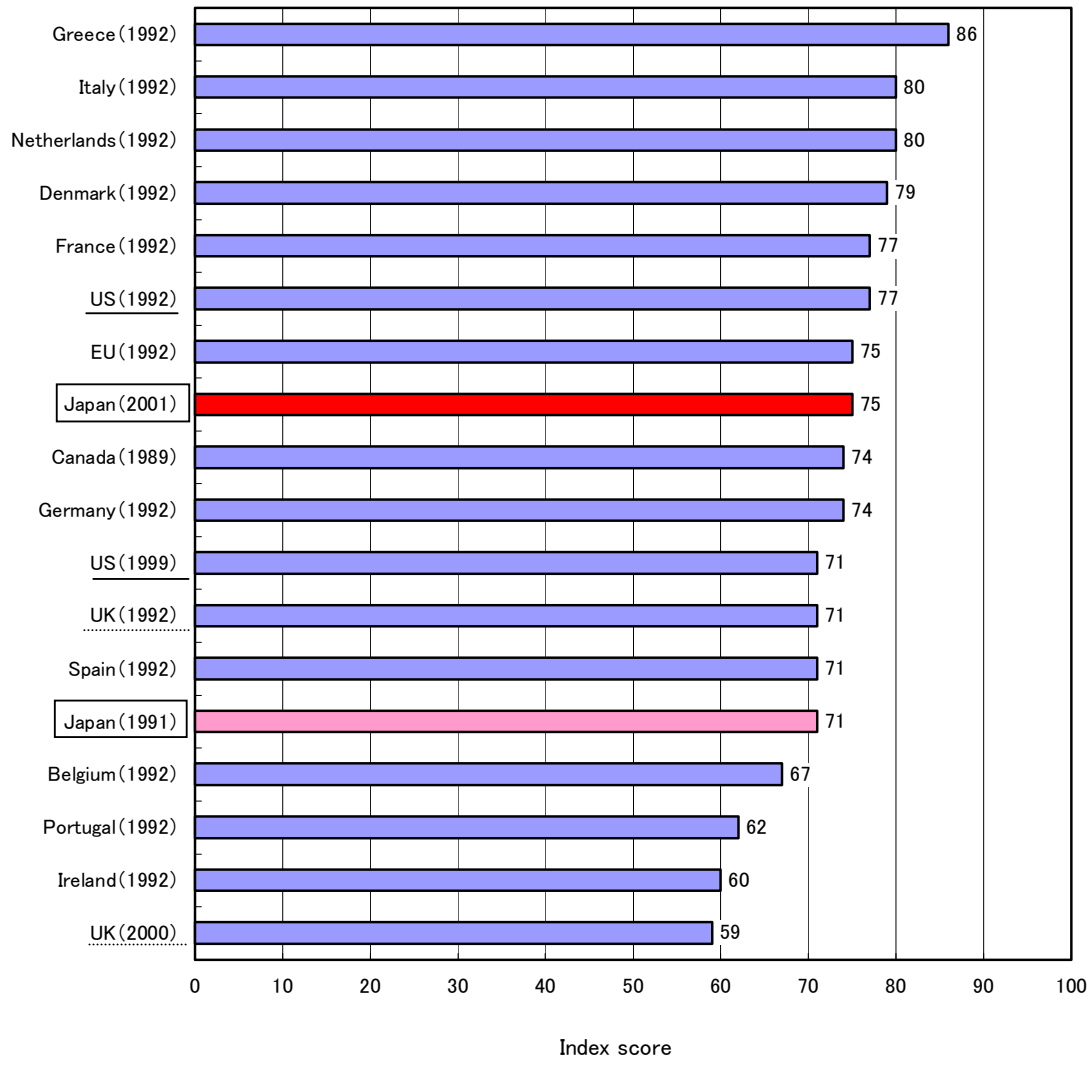


The index score is calculated based on the percentages of respondents who characterized their level of interest in "issues about new medical discoveries" as "very interested," "moderately interested," and "not at all interested."

International Comparison of Index Scores for Level of Interest in "Environmental Pollution"

Scores rose in Japan between 1991 and 2001, fell in the US between 1992 and 1999, and fell in the U.K.between 1992 and 2000. Data is only available for the EU from 1992 and for Canada from 1989.

Fig. 5 International comparison among 15 countries of index scores for level of interest in "environmental pollution"

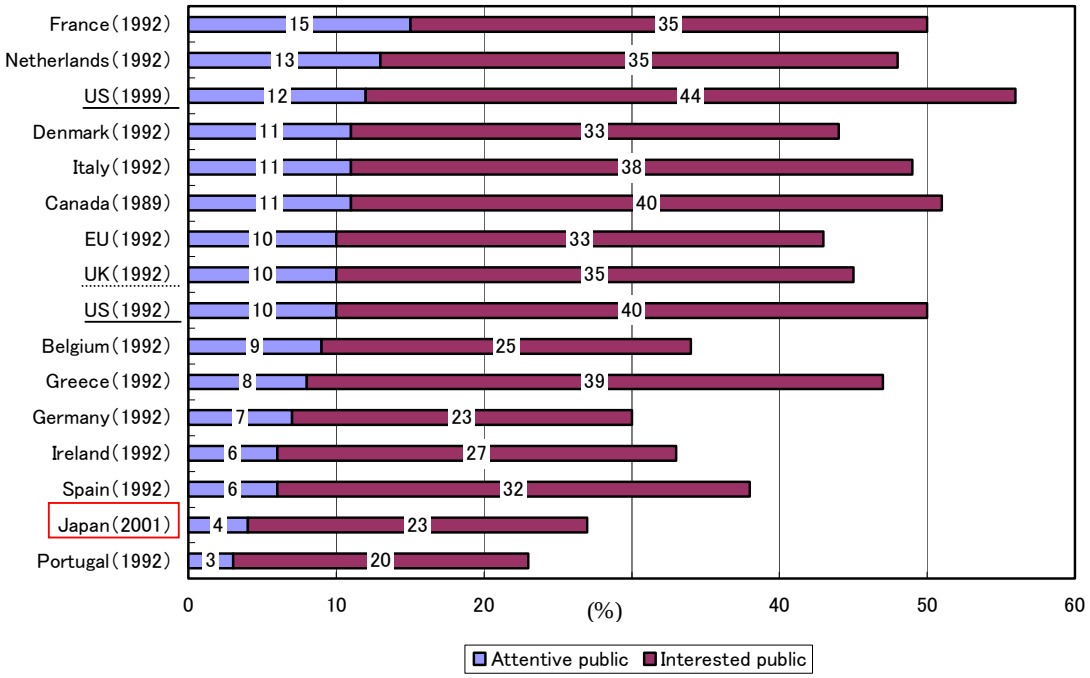


The index score is calculated based on the percentages of respondents who characterized their level of interest in "environmental pollution issues" as "very interested," "moderately interested," and "not at all interested."

International Comparison of the Size of the Attentive Public for S&T

The size of the "attentive public for S&T" in Japan is small compared with the other countries examined, though the survey year should be noted.

Fig. 6 International comparison among 15 countries of the attentive public for S&T



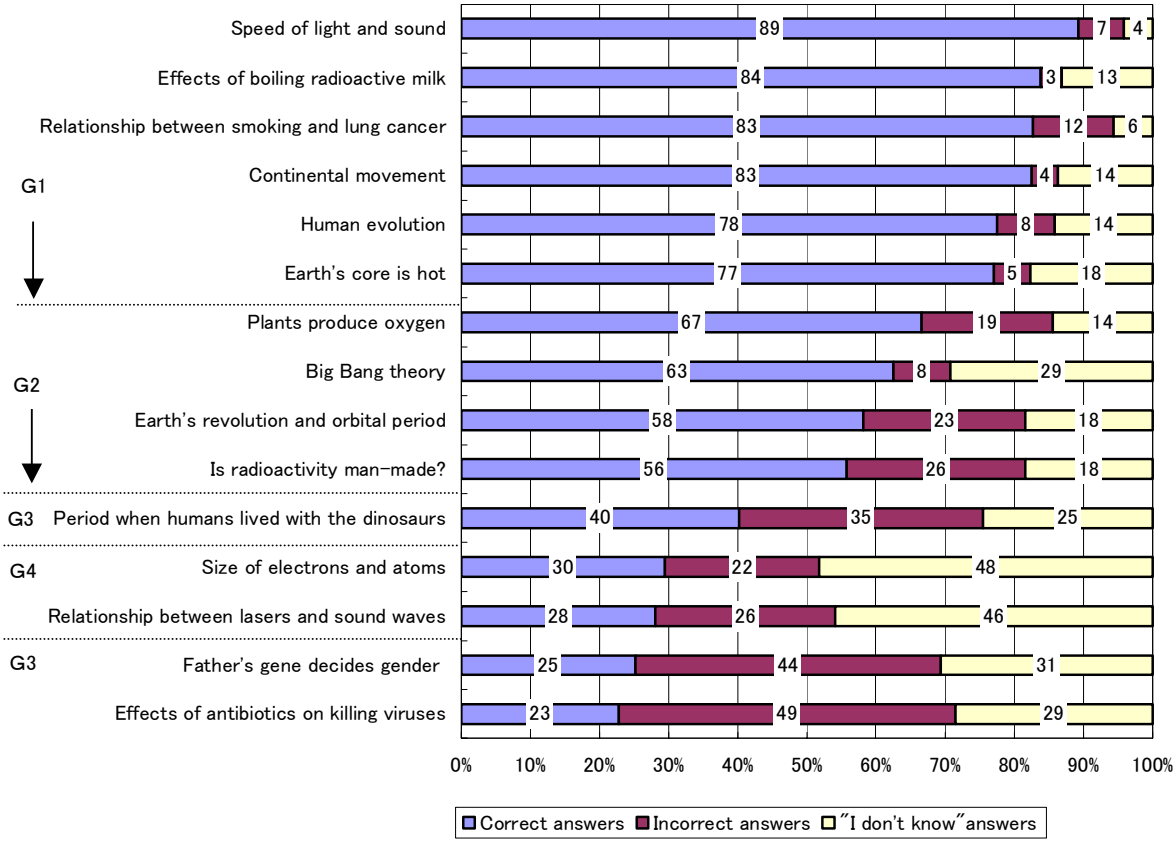
Attentive public for S&T
The ratio of people who, in response to questions about scientific discoveries and the use of new technological inventions, indicated that they were "very interested" in the issue, were "well informed" of the issue, and "read a newspaper on a daily basis" or "subscribe to a science and technology magazine."

Interested public for S&T
The ratio of people who, in response to questions about scientific discoveries and the use of new technological inventions, indicated that they were "very interested" in the issue (excludes those who can be categorized as part of the "attentive public" above).

Level of Understanding of Basic S&T Concepts

Levels of understanding of each basic S&T concepts were classified into four groups based on the percentages of their correct, incorrect, and "I don't know" answers.

Fig. 7 Level of understanding of basic S&T concepts (4-group classification using cluster analysis)



Cluster analysis: A method of statistical analysis for dividing items into groups. In this case, those topics which received similar percentages of correct, incorrect, and "I don't know" answers were divided into four groups, G1-4 (see Table 1).

Table 1 Classification using cluster analysis for the level of understanding of basic S&T concepts

Group 1 70% or more correct answers
Which travels faster: light or sound? (Light)
Radioactive milk can be made safe by boiling it. (False)*
Cigarette smoking causes lung cancer. (True)
The continents have been moving for millions of years and will continue to move. (True)*
Human beings, as we know them today, developed from earlier species of animals. (True)*
The center of the Earth is very hot. (True)*
Group 2 More than 50% but less than 70% correct answers
The oxygen we breathe comes from plants. (True)*
The universe began with a huge explosion. (True)
The Earth's revolution (It takes one year for the Earth to go around the Sun.)
All radioactivity is man-made. (False)*
Group 3 35% or more incorrect answers
The earliest humans lived at the same time as the dinosaurs. (False)*
It is the father's gene which decides whether the baby is a boy or a girl. (True)*
Antibiotics kill viruses as well as bacteria. (False)*
Group 4 45% or more "I don't know" answers
Electrons are smaller than atoms. (True)*
Lasers work by focusing sound waves. (False)*

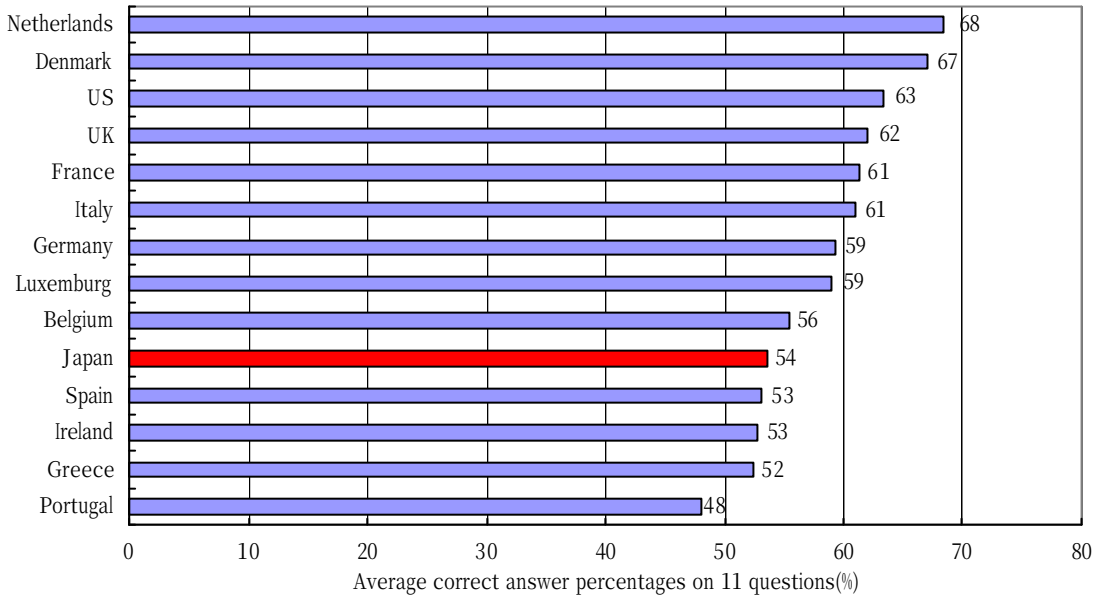
*11 items used for international comparison among 14 countries in the following page.

NOTE: This page was revised on October 21, 2002.

International Comparison of the Level of Understanding of Basic S&T Concepts

The Japan's average percentage of correct answers for questions regarding basic S&T concepts, which are described at the former page, is lower than those of most of other countries.

Fig.8 Level of understanding of basic S&T concepts in 2001



The data of all the nations come from surveys conducted in 2001. The data sources of European nations and the U.S. are Eurobarometer 55.2 and Science & Engineering Indicators 2002 respectively.

NOTE: This page was revised on October 21, 2002.

Attitude Toward S&T

There is a predominantly positive trend in attitudes toward S&T.

Fig.9 Has science made the world better?

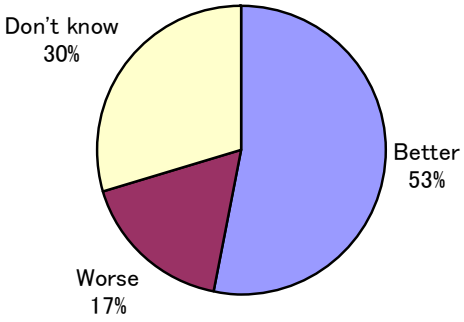
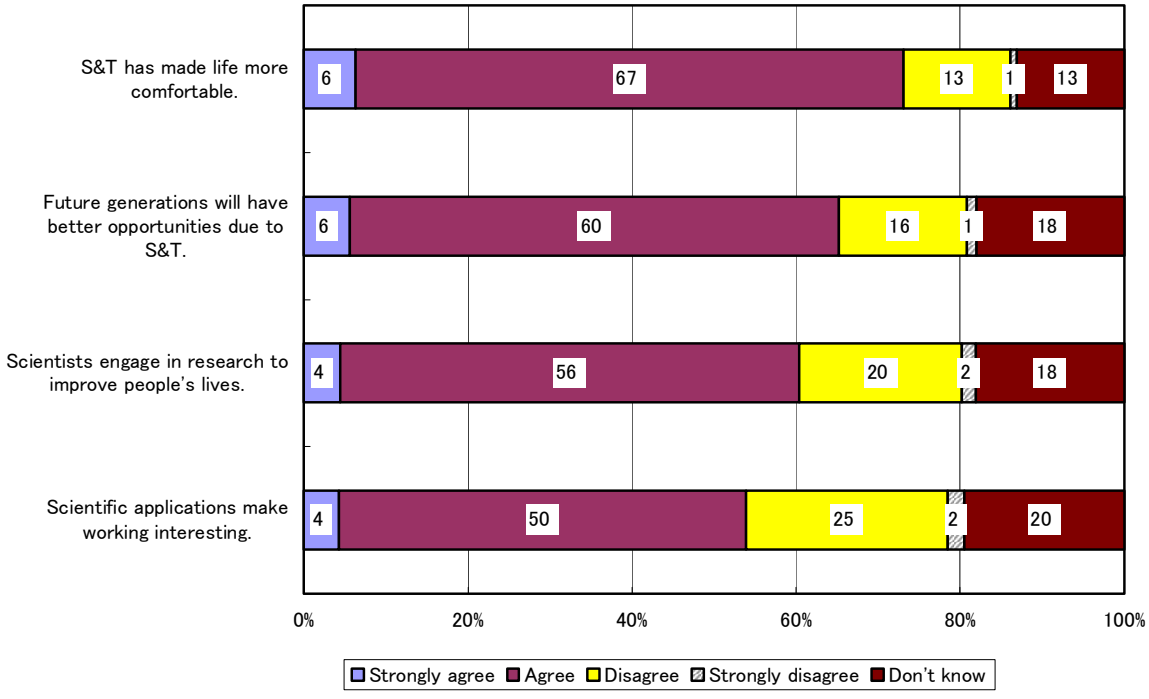


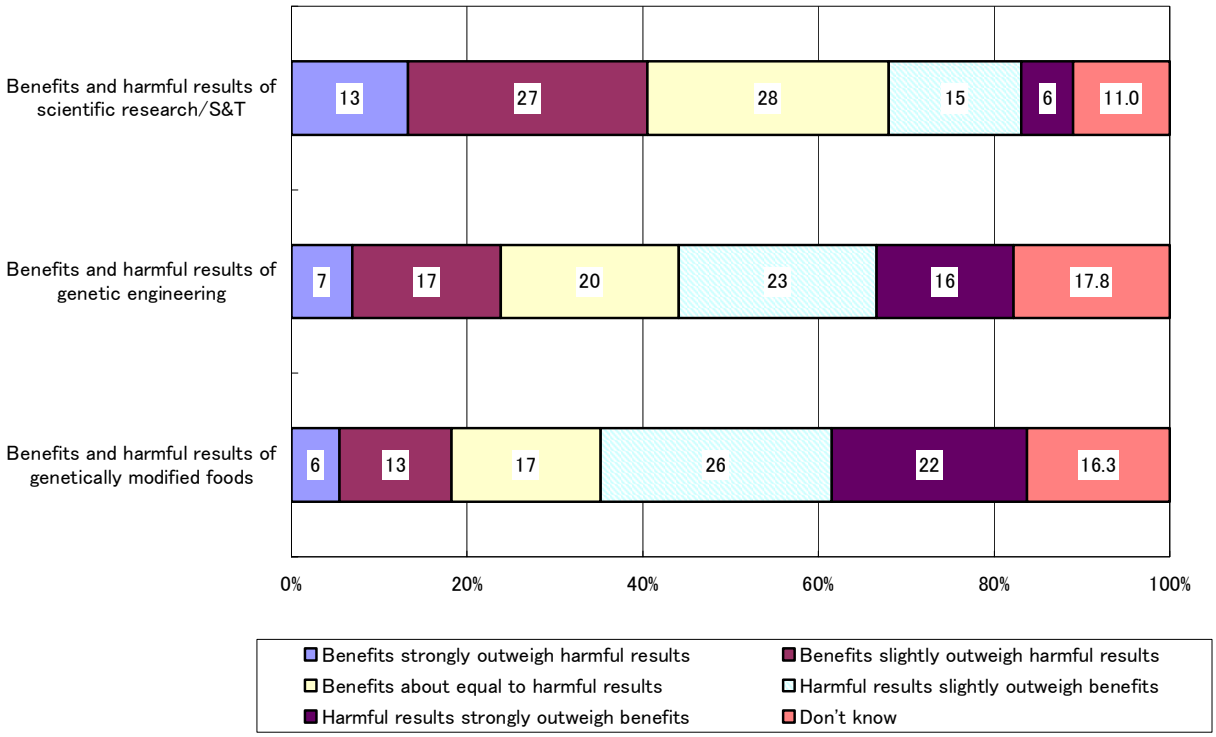
Fig. 10 Agree or disagree with positive opinions regarding S&T



Benefits and Harmful Results of Scientific Research

Those who feel that the benefits of scientific research outweigh the harmful results outnumber those who feel that the harmful results outweigh the benefits, but a large number of people are concerned about the harmfulness of genetically modified foods.

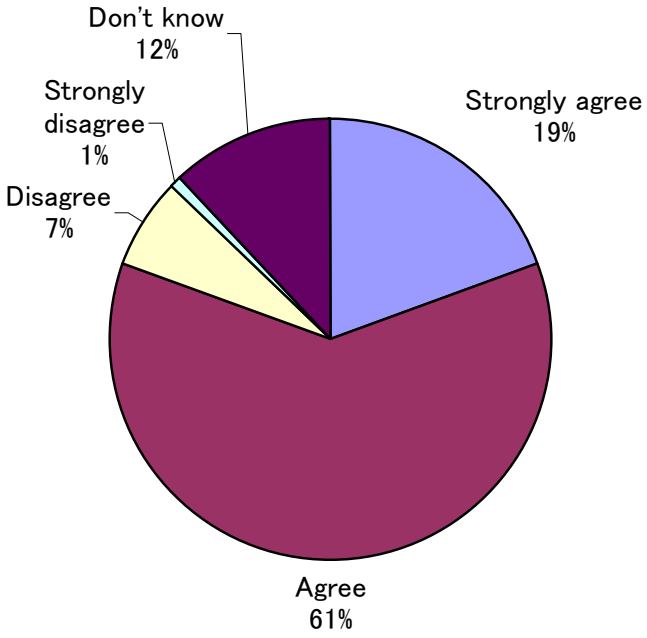
Fig. 11 Benefits and harmful results of scientific research



Government Support of Scientific Research

There is a high level of agreement with government support of scientific research.

Fig. 12 Agree or disagree with government support of scientific research



Source of S&T Information

Television and newspapers constitute the most common sources of S&T information. Respondents reported few visits to public facilities related to S&T.

Fig. 13 Current methods of obtaining S&T information (Multiple answers permitted)

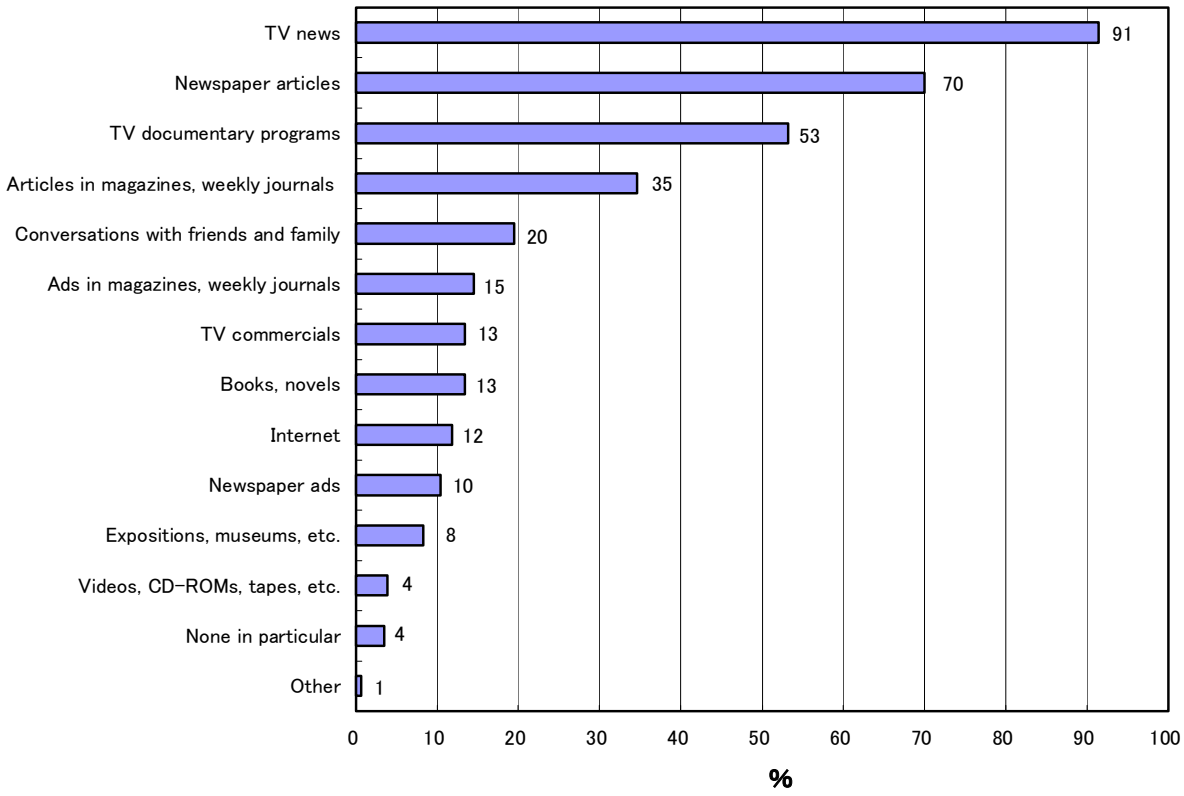


Table 2 Number of visits to public facilities per year (Unit: %)

	1	2	3	4	5 or more	0	Don't know
Art museums	16	10	5	1	3	65	1
National history museums	14	4	1	0	1	80	1
Zoos and aquariums (combined number)	23	11	5	2	2	57	0
S&T museums	10	2	1	0	1	87	1
Public libraries	9	8	6	3	21	53	1

Sources of S&T Information: S&T Magazines

The percentage of respondents who read S&T magazines is low.

Fig. 14 Reading of S&T magazines

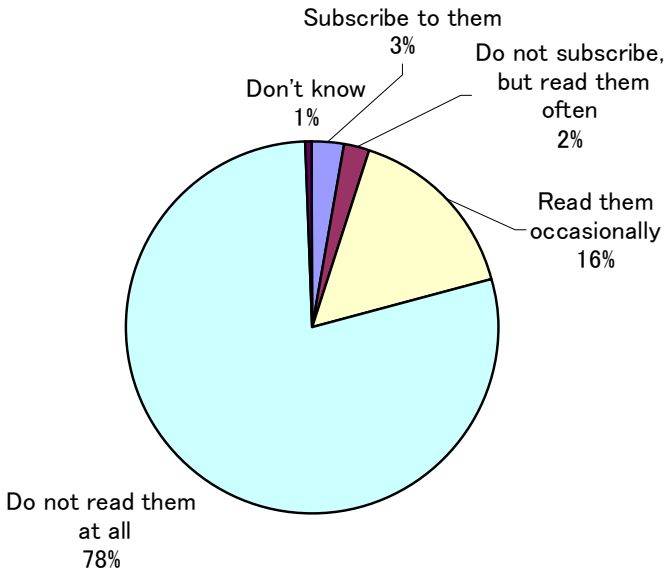


Fig. 15 Sources of S&T information: Satisfying methods of obtaining information (Multiple answers permitted)

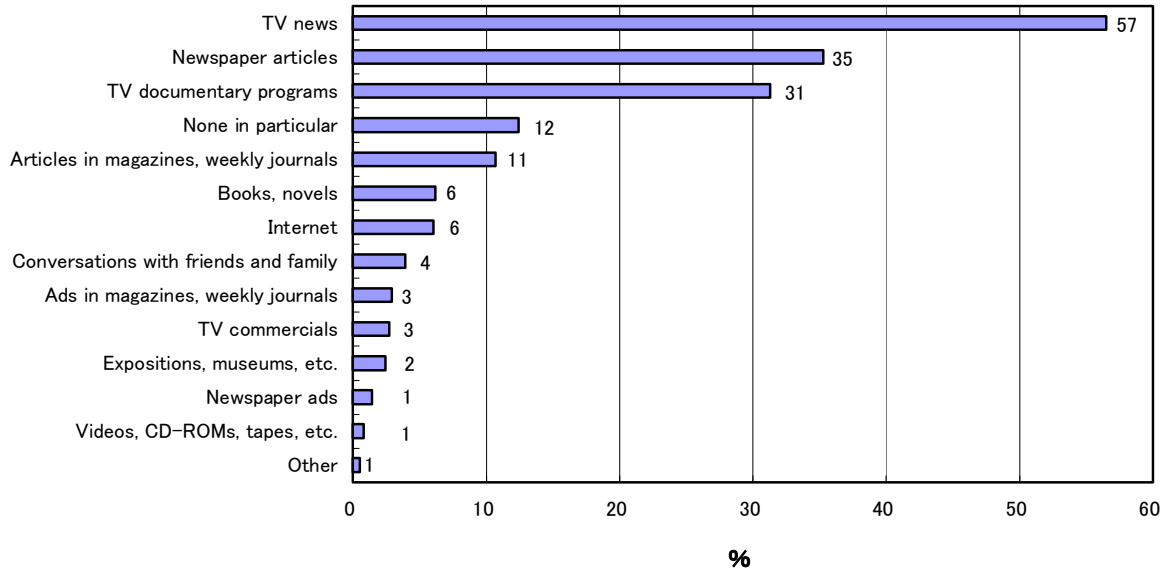
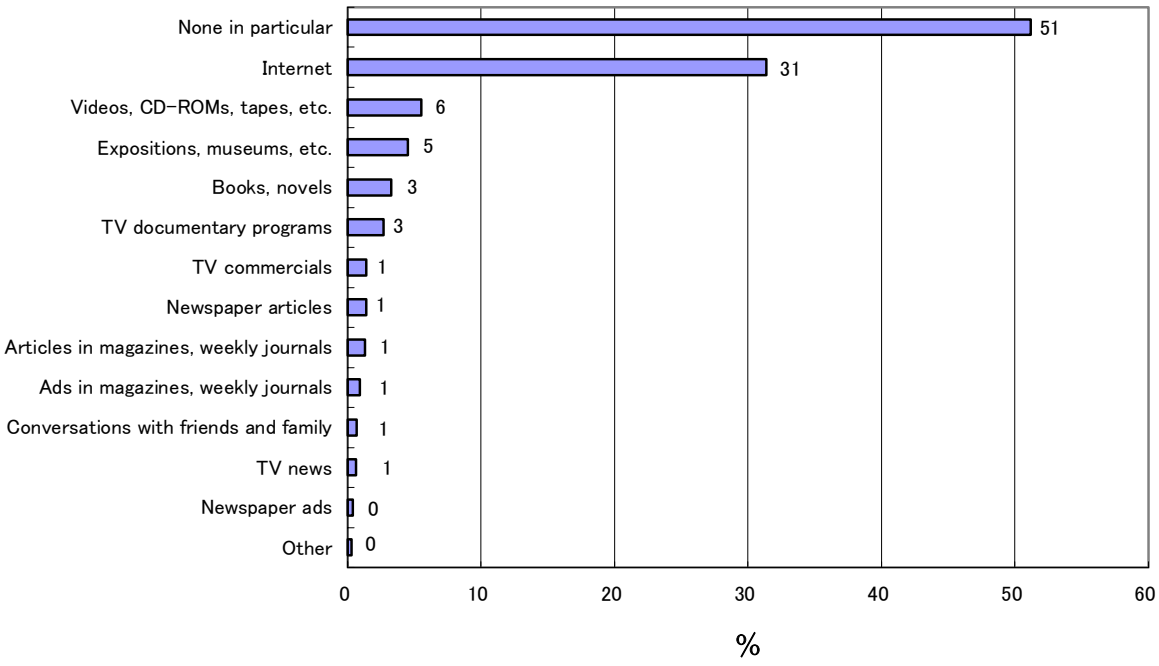


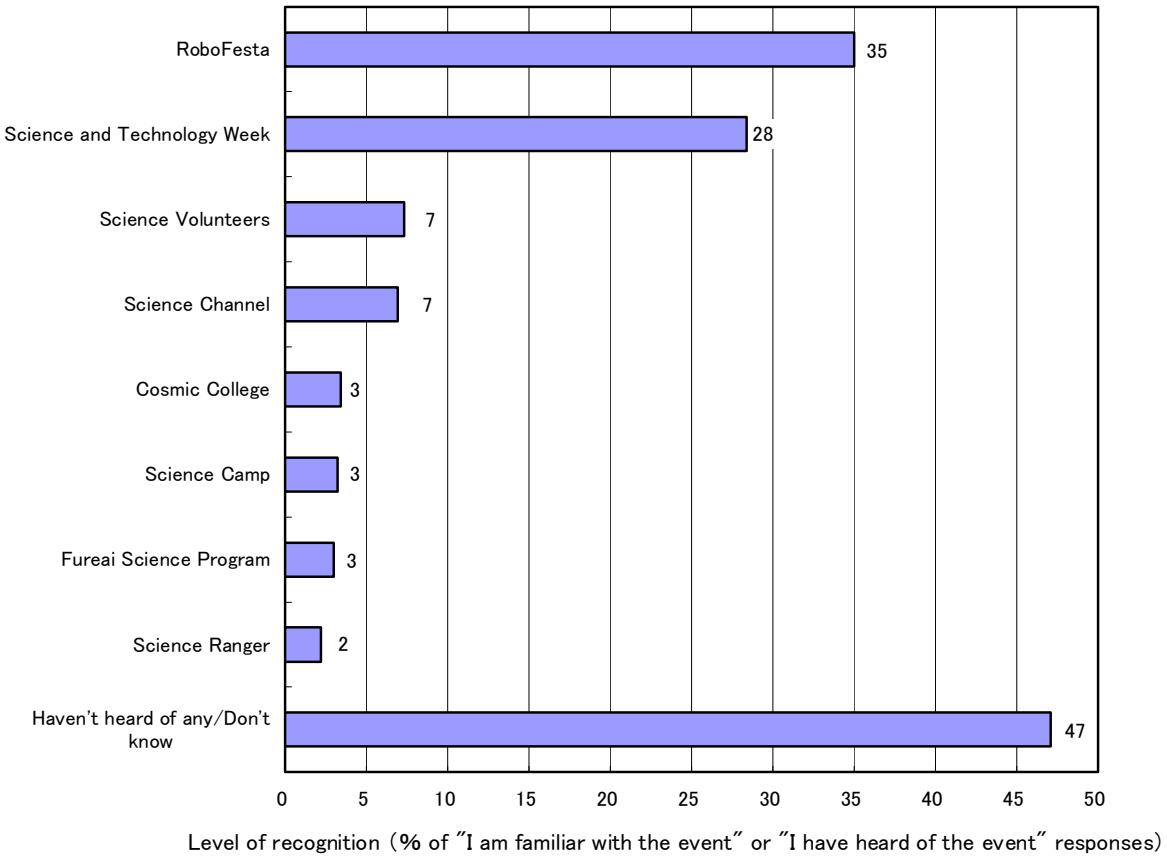
Fig. 16 Sources of S&T information: Methods of obtaining information I'd like to try in the future (Multiple answers permitted)



Name Recognition of the Government Activities for Promoting a Public Understanding of S&T

The survey revealed a high level of recognition of RoboFesta and Science and Technology Week as the names of events that promote the understanding of S&T, but events that are less well recognized may be targeted toward young people, who were not polled in this survey, or the activities may not be known by an official title.

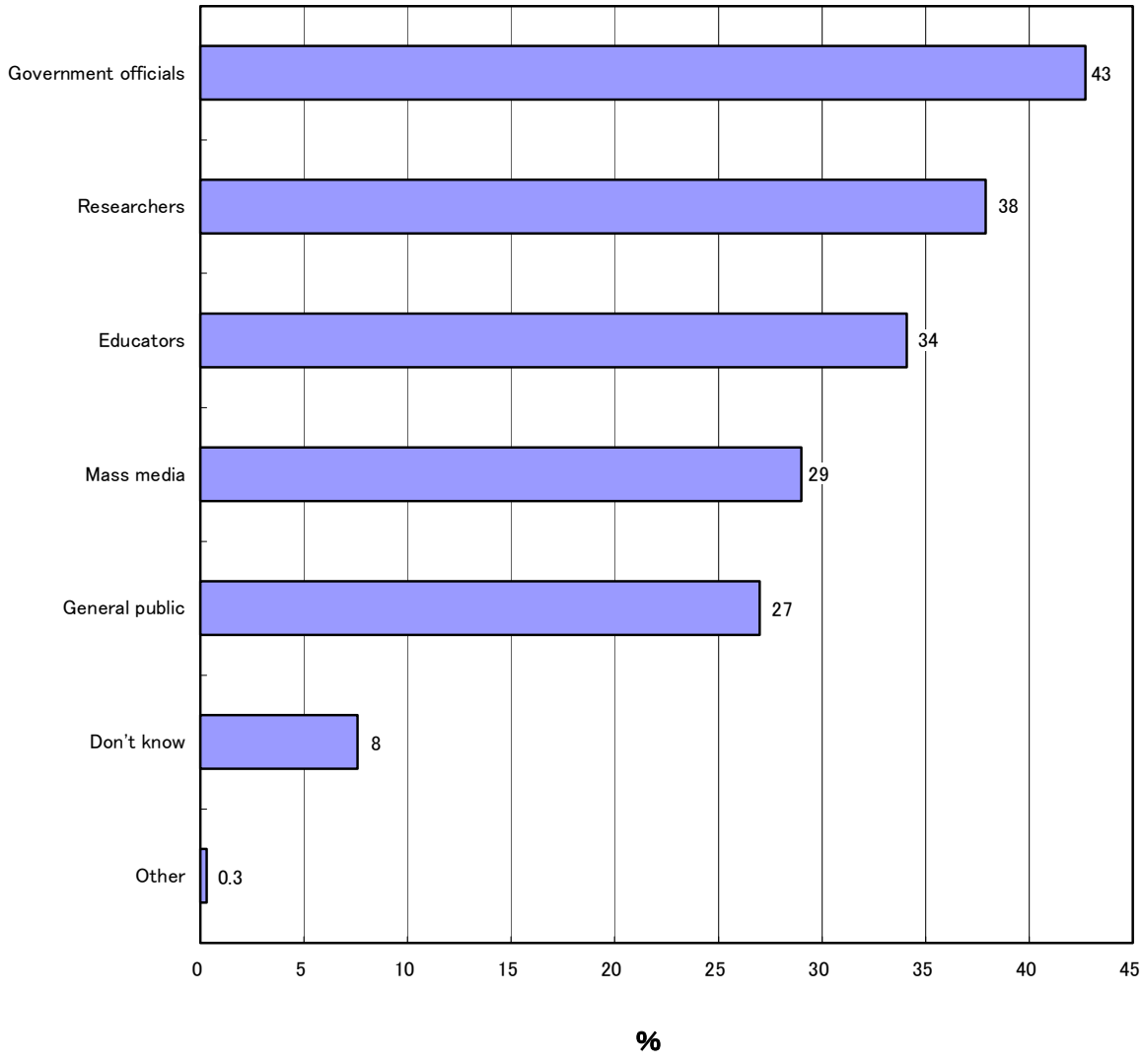
Fig. 17 Level of name recognition of activities that promote an understanding of S&T (Multiple answers permitted)



Opinions About Activities For Promoting Public Understanding of S&T: Who Should Work to Promote Understanding of S&T?

Respondents feel that government officials, researchers, and educators need to make efforts to promote the understanding of S&T among the general public.

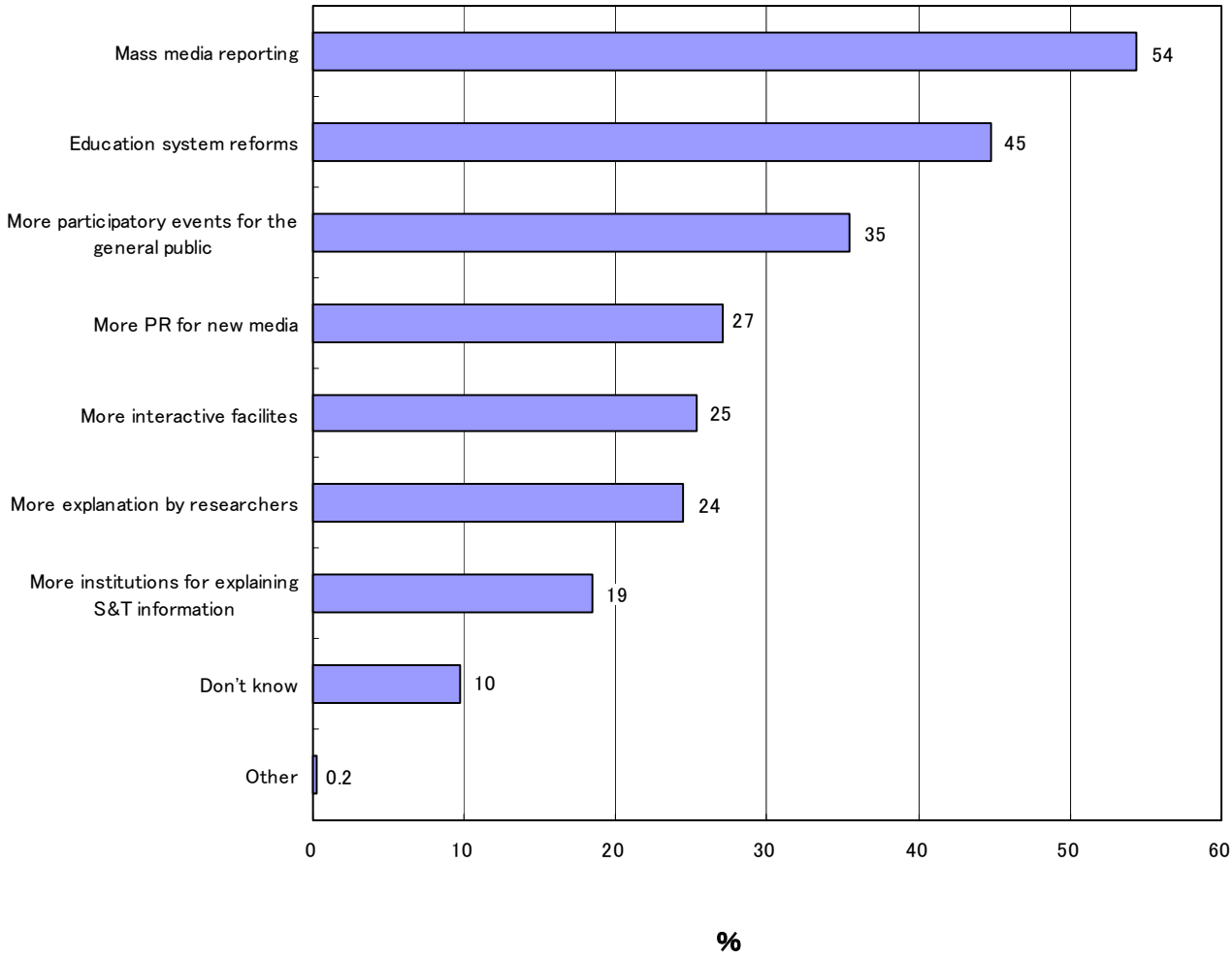
Fig. 18 Who should work to promote the understanding of S&T?
(Up to two answers permitted)



Opinions About Activities for Promoting Public Understanding of S&T: Efforts Needed to Help the Public Understand Scientific Research

Respondents feel that the accurate reporting of information by the mass media and education system reforms leads to an accurate understanding of research.

Fig. 19 Efforts needed to help the public understand scientific research (Up to three answers permitted)



Suggestions for S&T Policies

- Further research is needed on measures to raise the general public's interest in S&T to a level that is on par with other nations of the world.

- It is necessary to study how to improve the general public's knowledge about S&T so that they can rate themselves as being "well informed" about S&T issues.

- For raising the level of S&T literacy among adults, further study is needed on measures to develop school education by expanding university-level educational opportunities to adults, and by supplementing school education efforts with the dissemination of information over the Internet and the broadcasting of accurate S&T knowledge via TV, newspapers, magazines, and other mass media sources.

- The development of policies for raising the level of understanding of S&T needs setting specific goals, analyzing the progress made toward those goals, and using the results of that analysis.

- It is necessary to develop effective ways to utilize the results of this survey to help those who are engaged in activities aimed at raising the level of understanding of S&T.

Issues for Future Research

(1) Based on the results of this survey, the following issues for future research have been suggested.

- In order to identify the correlations between the *elements* such as age, gender, and educational background and the *factors* in the formation of the individual's attitudes toward S&T such as their interest in S&T and their S&T literacy, create an S&T attitude model for the general public through the use of such multivariate analysis methods as covariance structure analysis, a leading method of statistical analysis.

- Collect chronological data and perform international comparisons by conducting *Surveys of Public Attitudes Toward and Understanding of Science and Technology* every 2-3 years on a schedule, which is similar to that of the U.S.'s *Science and Engineering Indicators*.

- Conduct surveys of public attitudes in individual S&T fields, such as *Survey of Public Attitudes Toward Biotechnology*, which is already being implemented in Europe, the US, Canada, and Australia.

- Conduct a comprehensive analysis of the general public's contributions to the political decision-making process (through public commentary and other means) in the area of S&T policies through analyses of the content of newspaper and magazine articles that play an important role in the formation of public attitudes toward S&T.

- There are several ways to improve S&T attitude surveys. Introducing the second face-to-face interviews with the respondents to ask their reasoning for certain questions will improve accuracy on their responses. Develop new methods of measuring S&T literacy that suits Japan by making questionnaires, which reflect what are taught at Japanese schools.

- Conduct further research to prove the hypothesis that improving the public's interest in S&T raise the level of S&T literacy, which positively leads to support for S&T policies.

(2) Within the next year we plan to conduct detailed analyses (such as cross analysis, and multivariate analysis) on the results of this survey on public attitudes toward S&T. We, however, hope that the findings presented in this report will be discussed widely not only among researchers, government officials, and educators, but also by the mass media and others.