The Present Condition and Problems of Women in Science and Technology in Japan:

Difficulties in Continuing Careers in Japanese Society

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Contents

- Present condition and problems
- Why does Japan have relatively few female researchers?
- Social reasons and analysis of the historical process
- New changes in Japanese academic society
- Recent strategies for increasing women in S & T
- New drastic support programme from MEXT
Present Condition and Problems
Number and percentage of female researchers

Female researchers as a percentage of all researchers (right axis)

Male researchers (left axis)

Female researchers (left axis)

(1,000 persons) (%)


Percentage:
- 1992: 49.2%
- 1993: 53.6%
- 1994: 57.2%
- 1995: 61.1%
- 1996: 64.9%
- 1997: 70.5%
- 1998: 74.2%
- 1999: 76.1%
- 2000: 80.7%
- 2001: 82.0%
- 2002: 85.2%
- 2003: 88.7%
- 2004: 96.1%

Number:
- 1992: 570.8 thousand
- 1993: 591.3 thousand
- 1994: 607.6 thousand
- 1995: 621.5 thousand
- 1996: 650.0 thousand
- 1997: 656.8 thousand
- 1998: 681.1 thousand
- 1999: 681.2 thousand
- 2000: 668.7 thousand
- 2001: 707.5 thousand
- 2002: 702.5 thousand
- 2003: 734.4 thousand

(1,000 persons)
International comparison of percentage of female researchers

Latvia: 52.7%
Lithuania: 47.0%
Portugal: 46.6%
Bulgaria: 45.5%
Estonia: 43.3%
Romania: 43.3%
Greece: 42.8%
Poland: 40.9%
Slovenia: 38.1%
Spain: 36.8%
Iceland: 35.4%
Hungary: 33.0%
United States: 32.5%
Ireland: 29.4%
Cyprus: 29.3%
Finland: 29.1%
Norway: 28.3%
Denmark: 28.0%
Italy: 27.9%
France: 27.5%
Czech Republic: 26.8%
United Kingdom: 26.0%
Slovakia: 24.0%
Sweden: 21.2%
Austria: 18.8%
Germany: 15.5%
Japan: 11.6%
Why does Japan have relatively few female researchers?

Three factors

1. Heavier female care responsibilities
2. Fewer job opportunities as a female researcher
3. Smaller number of female students majoring in science and engineering
Difficulty of continuing research because of childbirth, childcare, and nursing care

Female respondents 2002: 62.8%
Male respondents 2002: 44.8%

1997 female: 61.1%
1997 male: 55.2%

Fewer job opportunities as female researchers

2002 female: 44.2%
2002 male: 39.1%

1997 female: 56.5%
1997 male: 37.6%

Small number of female students majoring in natural science

2002 female: 23.3%
2002 male: 44%

1997 female: 18.5%
1997 male: 55.2%
How many hours do researchers spend on household, childcare or nursing care duties?

- Female researchers (without a child):
  - Less than 1 hour: 43.2%
  - More than 1 hour, but not exceeding 2 hours: 34.1%
  - More than 2 hours, but not exceeding 3 hours: 13.1%
  - More than 3 hours, but not exceeding 5 hours: 5.7%
  - More than 5 hours: 3.2%
  - No answer: 0.8%

- Female researchers (with a child):
  - Less than 1 hour: 8.9%
  - More than 1 hour, but not exceeding 2 hours: 15.3%
  - More than 2 hours, but not exceeding 3 hours: 15.6%
  - More than 3 hours, but not exceeding 5 hours: 40.4%
  - More than 5 hours: 18.9%
  - No answer: 0.9%

- Male researchers (without a child):
  - Less than 1 hour: 69.1%
  - More than 1 hour, but not exceeding 2 hours: 20.6%
  - More than 2 hours, but not exceeding 3 hours: 4.0%
  - More than 3 hours, but not exceeding 5 hours: 4.4%
  - More than 5 hours: 1.6%
  - No answer: 0.2%

- Male researchers (with a child):
  - Less than 1 hour: 59.6%
  - More than 1 hour, but not exceeding 2 hours: 25.6%
  - More than 2 hours, but not exceeding 3 hours: 8.4%
  - More than 3 hours, but not exceeding 5 hours: 4.5%
  - More than 5 hours: 0.7%
  - No answer: 0.1%
Percentage of undergraduate majors

<table>
<thead>
<tr>
<th>Subject</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>8.8</td>
<td>27.4</td>
</tr>
<tr>
<td>Social sciences</td>
<td>44.1</td>
<td>29.8</td>
</tr>
<tr>
<td>Science</td>
<td>4.3</td>
<td>4.7</td>
</tr>
<tr>
<td>Engineering</td>
<td>26.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Agriculture</td>
<td>2.7</td>
<td>8.5</td>
</tr>
<tr>
<td>Medical/dental science</td>
<td>2.8</td>
<td>14.7</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>0.3</td>
<td>2.5</td>
</tr>
<tr>
<td>Home economics</td>
<td>1.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chart 15: Percentage of undergraduate majors.
Percentage of female students at undergraduate and graduate level

<table>
<thead>
<tr>
<th>Field</th>
<th>Undergraduate</th>
<th>Master's course</th>
<th>Doctoral course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>67.5%</td>
<td>56.4%</td>
<td>51.6%</td>
</tr>
<tr>
<td>Social sciences</td>
<td>31.1%</td>
<td>34.7%</td>
<td>32.2%</td>
</tr>
<tr>
<td>Science</td>
<td>25.8%</td>
<td>21.8%</td>
<td>17.2%</td>
</tr>
<tr>
<td>Engineering</td>
<td>10.6%</td>
<td>10.0%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>40.8%</td>
<td>35.8%</td>
<td>33.9%</td>
</tr>
<tr>
<td>Medical/dental science</td>
<td>35.8%</td>
<td>27.8%</td>
<td>27.9%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>57.9%</td>
<td>47.4%</td>
<td>45.1%</td>
</tr>
<tr>
<td>Home economics</td>
<td>92.8%</td>
<td>86.6%</td>
<td>85.4%</td>
</tr>
<tr>
<td>Education</td>
<td>61.4%</td>
<td>51.6%</td>
<td>50.7%</td>
</tr>
</tbody>
</table>
Analysis of the Historical Process
Proportion of pupils completing compulsory education who go on to enter university or 2 year college

- **Proportion of pupils completing compulsory education who go on to enter university**

- **Female 2 year college students**

- **Female university students**

Proportion of female students

Female students who enter university

Master's course

Students on doctoral course
Historical change in the proportion of female students in each department

- Humanities
- Education
- Health
- Agriculture
- Social sciences
- Science
- Engineering
Historical change of the proportion of the female students in science
Graduation from departments of science and engineering does not give any national licenses. However, in contrast, female students in pharmacy and medicine can enjoy the advantage of a national license. This suggests that it is important for female students to know role models in science and engineering and various career paths.
Challenge of Women’s Universities

- In 2005, two famous private women’s universities opened a pharmacy department.
- Both are Christian universities with long traditions of preparing young women to be good wives and wise mothers.
- Recently some women’s universities have opened a new department for nationally licensed technicians.
- The career paths for female students are gradually increasing.
left
Female science teachers in junior high school

right
Female maths teachers in junior high school

100% 100% 0% 0%
Analysis of the Historical Process

* Female students and staff are increasing
* More female students prefer univs. to colleges.
* Female undergraduates have peaked.
* Female graduate students are increasing
* Tendencies among female students’ majors have remained almost the same for last five years.

If we introduce more female students to S&T new policies should be called for!!!
Revolutionary New Policies
Recent incentives
Revolutionary new policies

- Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE) was organized in 2002.
- Initiative by the Science Council of Japan
- Encouraging female researchers’ return for second career (new programme from MEXT)
- Offer information on support for choosing career paths (new programme from MEXT)
Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE)

founded in 2002
27 full member societies and 20 observer societies as of 2005

The Japan Society of Applied Physics; The Society of Chemical Engineers, Japan; The Society of Polymer Science, Japan; Japanese Society for Biological Sciences in Space; The Chemical Society of Japan; Atomic Energy Society of Japan; The Japanese Society of Plant Physiologists; The Mathematical Society of Japan; The Japanese Biochemical Society; The Biophysical Society of Japan; Protein Science Society of Japan; Physiological Society of Japan; Astronomical Society of Japan; The Zoological Society of Japan; The Physical Society of Japan; The Molecular Biology Society of Japan; The Society of Japanese Women Scientists; The Japan Society for Comparative Endocrinology; The Japanese Society of Developmental Biologists; Japan Society for Cell Biology; The Institute of Electronics, Information and Communication Engineers; Ecological Society of Japan; Japanese Forestry Society; Society of Geomagnetism and Earth, Planetary and Space Sciences; The Japan Neuroscience Society; Bioimaging Society; The Japanese Society of Carbohydrate Research and 20 observer societies.
Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE)

Founded in 2002

Activity in 2003: symposium

Activity in 2004: symposium
  Questionnaire survey
  Adopted suggestion: request for childcare support system

Activity in 2005: symposium
  Adopted suggestion: expansion of application frame for research grants
  Request for more female members of SCJ
  Survey of female member rates in 40 member and 12 non member societies
  Active lobbying for female researchers in S&T

Responses from 19,291 members
A science summer school for girl high school students was held for the first time in 2005 under the auspices of the Physical Society of Japan, EPMEWSE, the National Women’s Education Center, and the special Committee of SCJ, and under the sponsorship of MEXT and the Cabinet Office.

100 high school students and teachers took part. All participants hope to take part in similar events in future.
In June 2000, the SCJ set a numerical target for increasing the percentage of female members to 10% within the next 10 years.
New policies from MEXT 2006 for revitalizing the activities of female scientists and engineers

- Positive support for female students of S&T
  * providing information on various career paths in S&T for female pupils, high school students, students and postgraduates and parents
  * providing exchange opportunities between students and researchers in S&T
- Positive support for balancing research and childcare

The Science and Technology Basic Plan for the third term 2006-2010
Positive support for female students of S&T

Information on various career paths

Career up

Research and childcare

University

Graduate school

Employment

Postgraduates

Researchers, engineers

Students

Junior high school and high school students
Positive support for balancing research and childcare

Childbirth and childcare: Research interruption

Encouraging researchers’ return for second career

Comeback!
Conclusion

- Organizing EPMEWSE in 2002 has brought about new trends in promoting equal participation.
- Current dramatic increase of female membership of SCJ seems to be the beginning of an equal relationship between the sexes.
- New policies from MEXT 2006 will revitalize the activities of female scientists and engineers.

Japanese society is putting gender mainstreaming in S&T in gear.
This will eventually bring about changes.
sources

- Slides 4, 8, 9, and 10 were from *White Paper on Gender Equality 2005* published by the Cabinet Office.
- Slides 7 and 25 were based on *White Paper (ibid.)*.
  USA: NSF *Science and Engineering Indicators 2004.*
  Japan: MPHPT *Survey of Research and Development 2003.*
- Slides 12, 13, 14, 15, and 16 were made based on *Basic Survey on School (MEXT).*
- Slide 18 was from *An International Comparison of Maths Education and Science Education 2001* by the National Institute for Educational Policy Research (NIER).
- The picture on slide 24 was from the Home Page of the National Women's Education Center.
P.S. Construction of S&T community in Asia

- The Science and Technology Basic Plan for the third term 2006-2010 (MEXT) declares the importance of forming an Asian community of S&T.
- Now I have launched a project on women and S&T in Asia, involving many Asian researchers, and with the support of the Toyota Foundation.
- The first Japan & Korea joint seminar on physics will be held.

APCTP International Workshop on Asian Women in Physics
APCTP headquarters, Pohang, Korea
November 23-25, 2005