Empowerment of Female Researchers in STEM Fields in Japan

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Outline

- The present state of gender equality in Japan
  - Review the current sate through statistics
    - Japan
    - the University of Tokyo
- Initiatives for empowerment of female researchers in STEM fields
  - JST
  - STEAM education by the Office for Next Generation, Institute of Industrial Science
- Future Perspectives

Self-Introduction

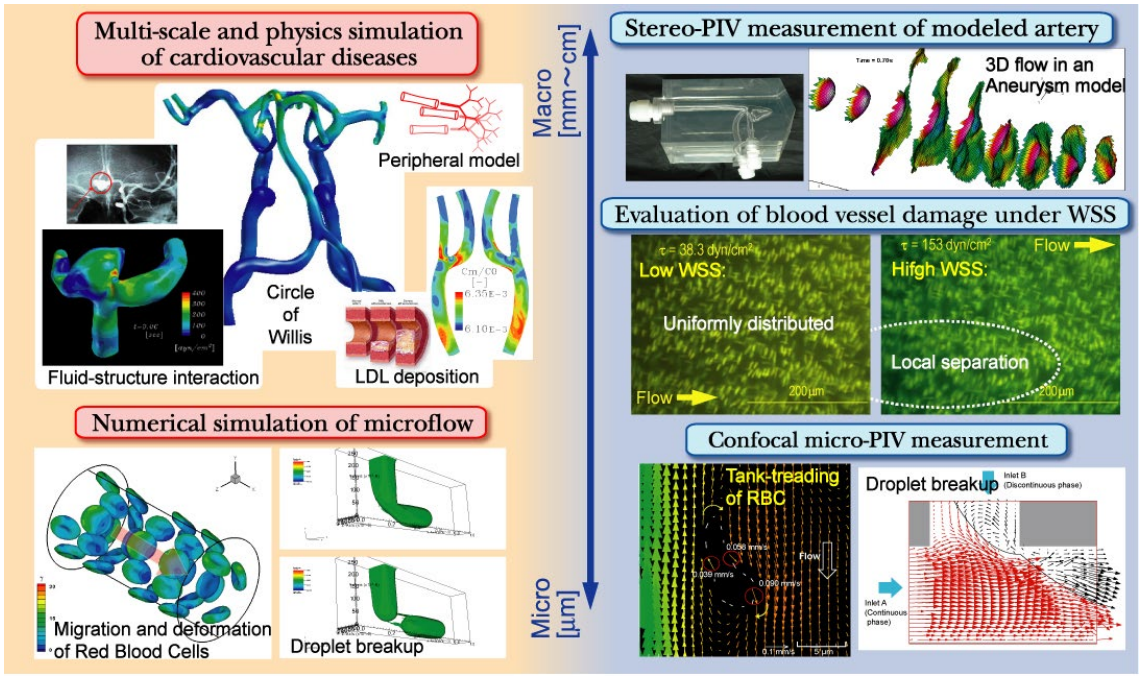
[Background]

Mechanical Engineering, particularly, Computational Hemodynamics

[Research Topics] Bio-Micro Fluid Engineering

- Image-Based modeling and multi-scale blood flow simulation for cardiovascular diseases
- Visualization & measurement for microfluidics
- Designing of STEM/STEAM education

1992 Graduated from Department of Nuclear Engineering, the University of Tokyo
Since 1992, working at the institute of industrial Science, the University of Tokyo
2017 President of the JSME (Japan Society of Mechanical Engineers)
Since 2022 October, *Director of Diversity and Inclusiveness* Japan Science and Technology Agency (JST)



The present state of gender equality in Japan

The Global Gender Gap Index

Gender equality ranking

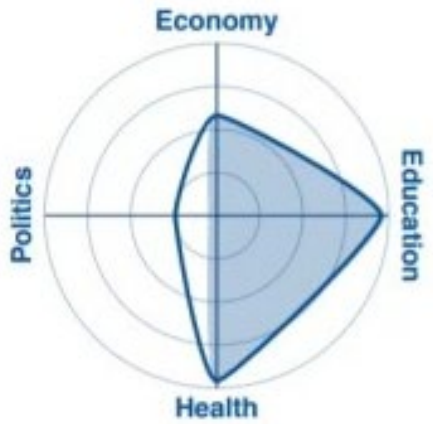
This year	(Last year)	146 countries	Gender gap score
1	1	Iceland	Improvement ↗
2	3	Norway	↗
3	2	Finland	↗
4	4	New Zealand	↗
5	5	Sweden	Deterioration ↘
6	10	Germany	↗
7	7	Nicaragua	↗
8	8	Namibia	↘
9	11	Lithuania	↗
10	14	Belgium	↗
43	27	United States	↘
105	99	South Korea	↘
107	102	China	↘
125	116	Japan	↘
146 (lowest)	146	Afghanistan	↘

Source: Global Gender Gap Report 2023 by World Economic Forum

Japan

rank (out of 153 countries) 121

score (0.00 = imparity, 1.00 = parity) 0.652

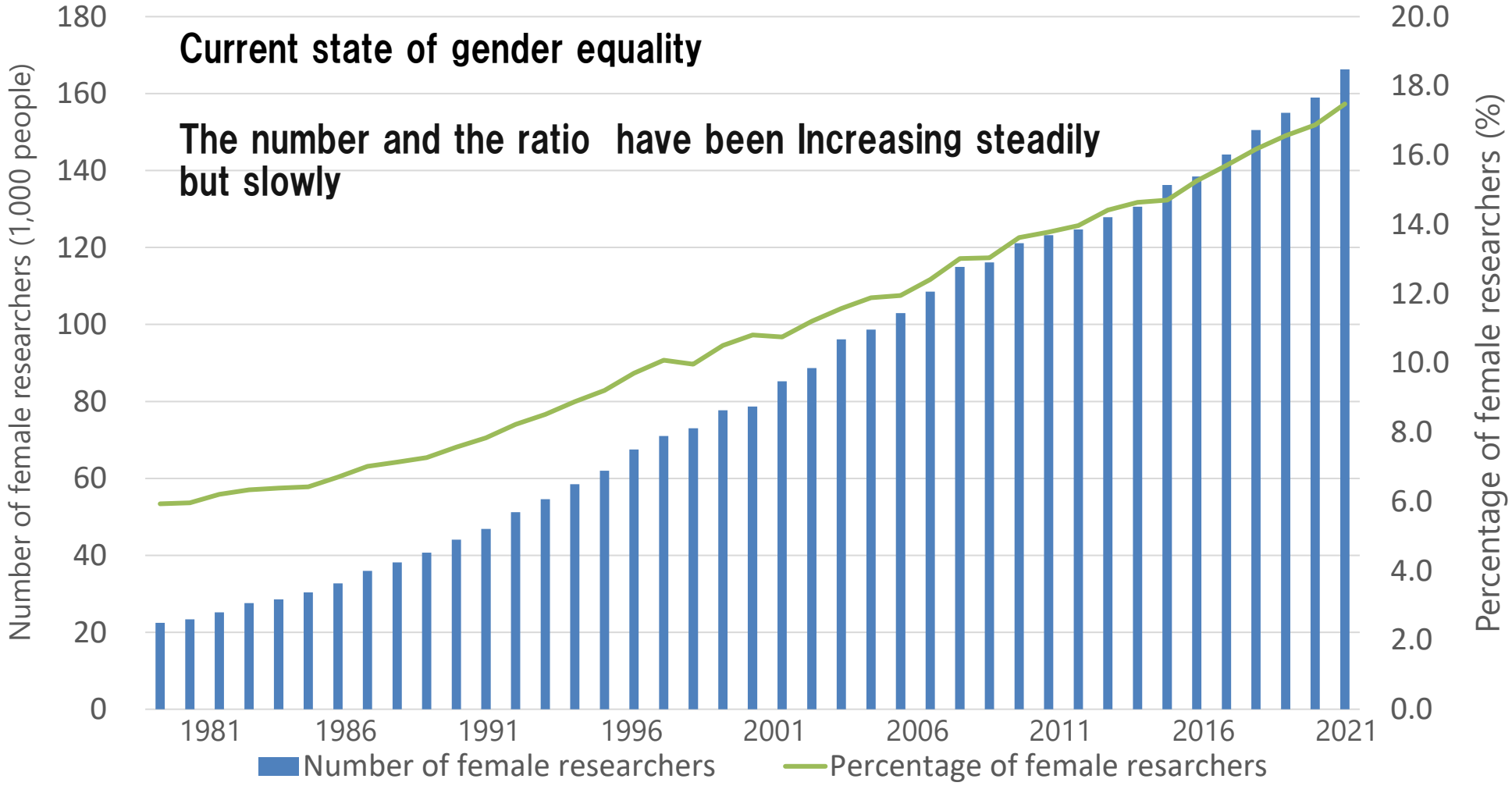


	2006 score		2020 score	
Global Gender Gap Index	**80**	**0.645**	**121**	**0.652**
Economic participation and opportunity	83	0.545	115	0.598
Educational attainment	60	0.986	91	0.983
Health and survival	1	0.980	40	0.979
Political empowerment	83	0.067	144	0.049

low rankings in

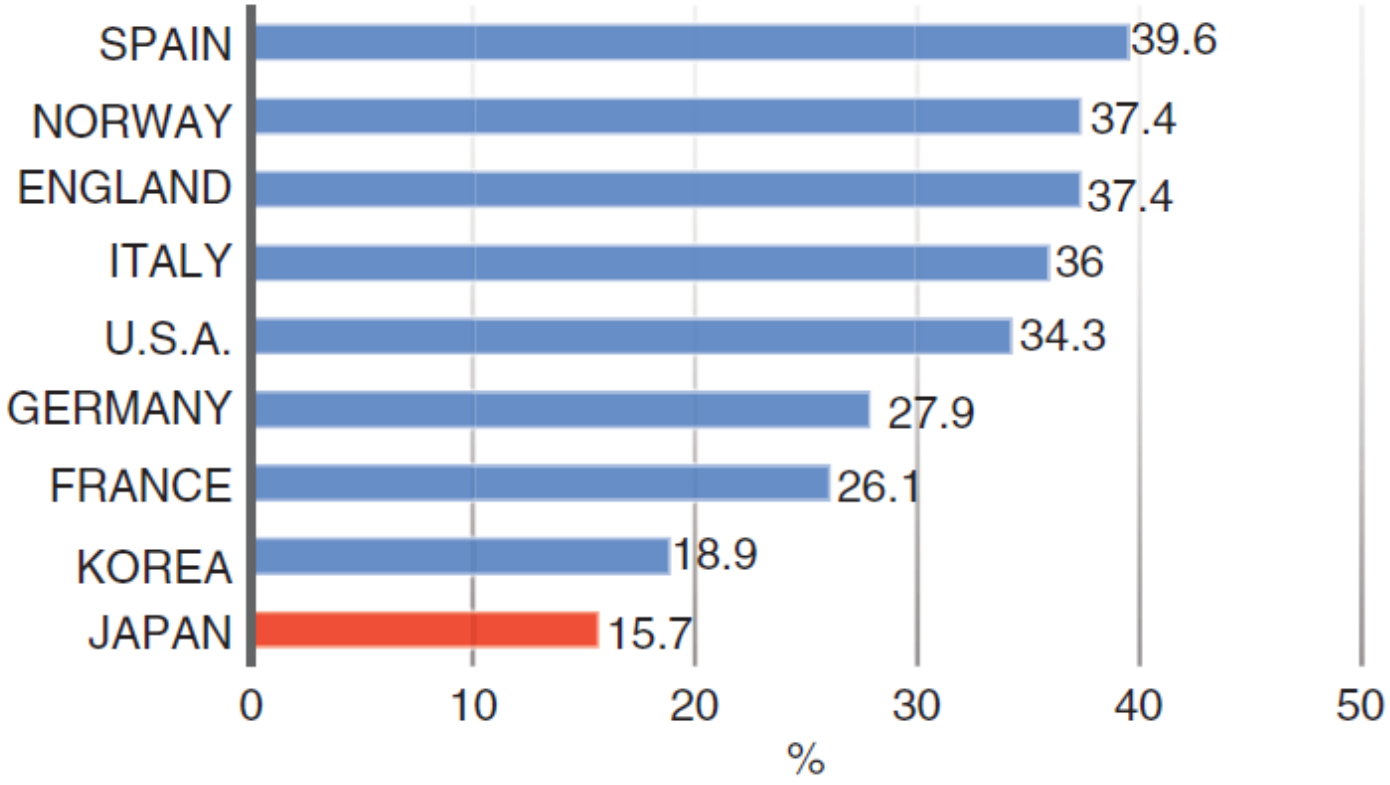
- **economy**
  low rate in labor force participation
  -→ permanent vs non-permanent
- **politics**
  low rate in political and leadership positions.

Female researchers in Japan



https://www.nistep.go.jp/sti_indicator/2022/RM318_table.html

Comparison of female researchers in OECD countries



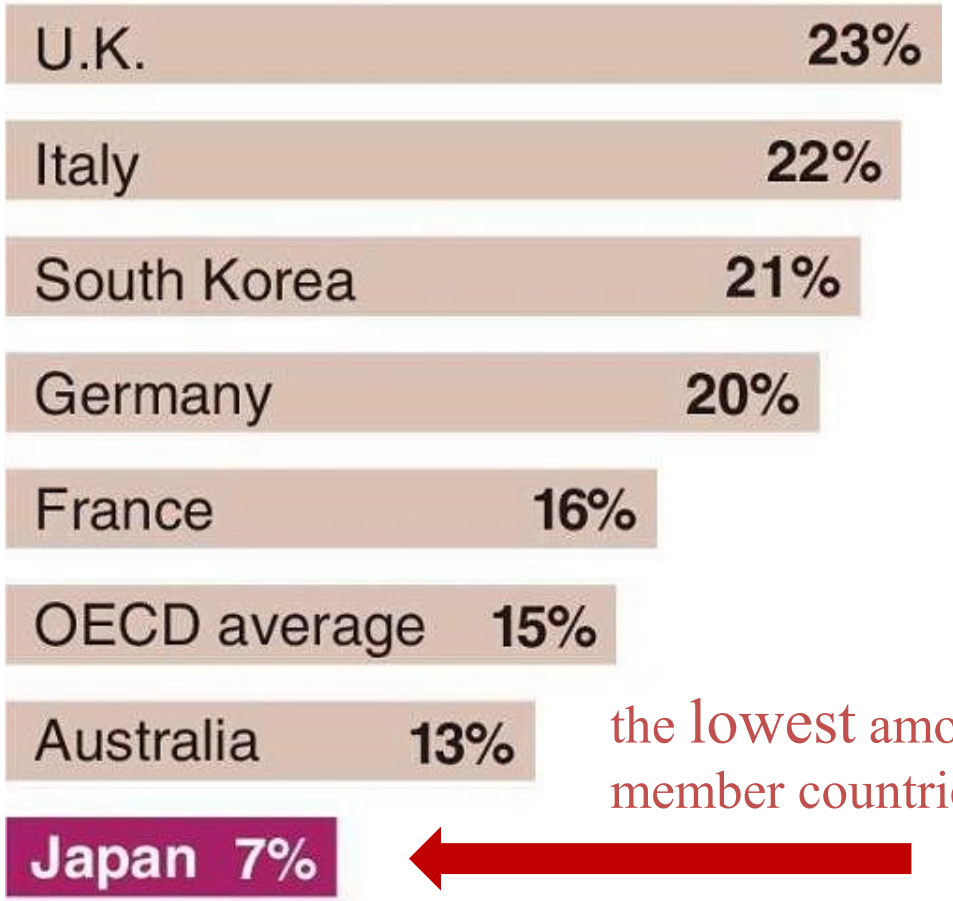
The proportion of female researchers – including the humanities, social science, and natural science – was only 15.7 % in 2017.

It is far behind other OECD countries

The female ratio in the STEM fields is notably low.

(The Cabinet Office, Gender Equality Bureau, 2017)

Percentage of female students in science and engineering



Source: Based on statistics released in 2019 by the OECD.

Yomuri Shinbun

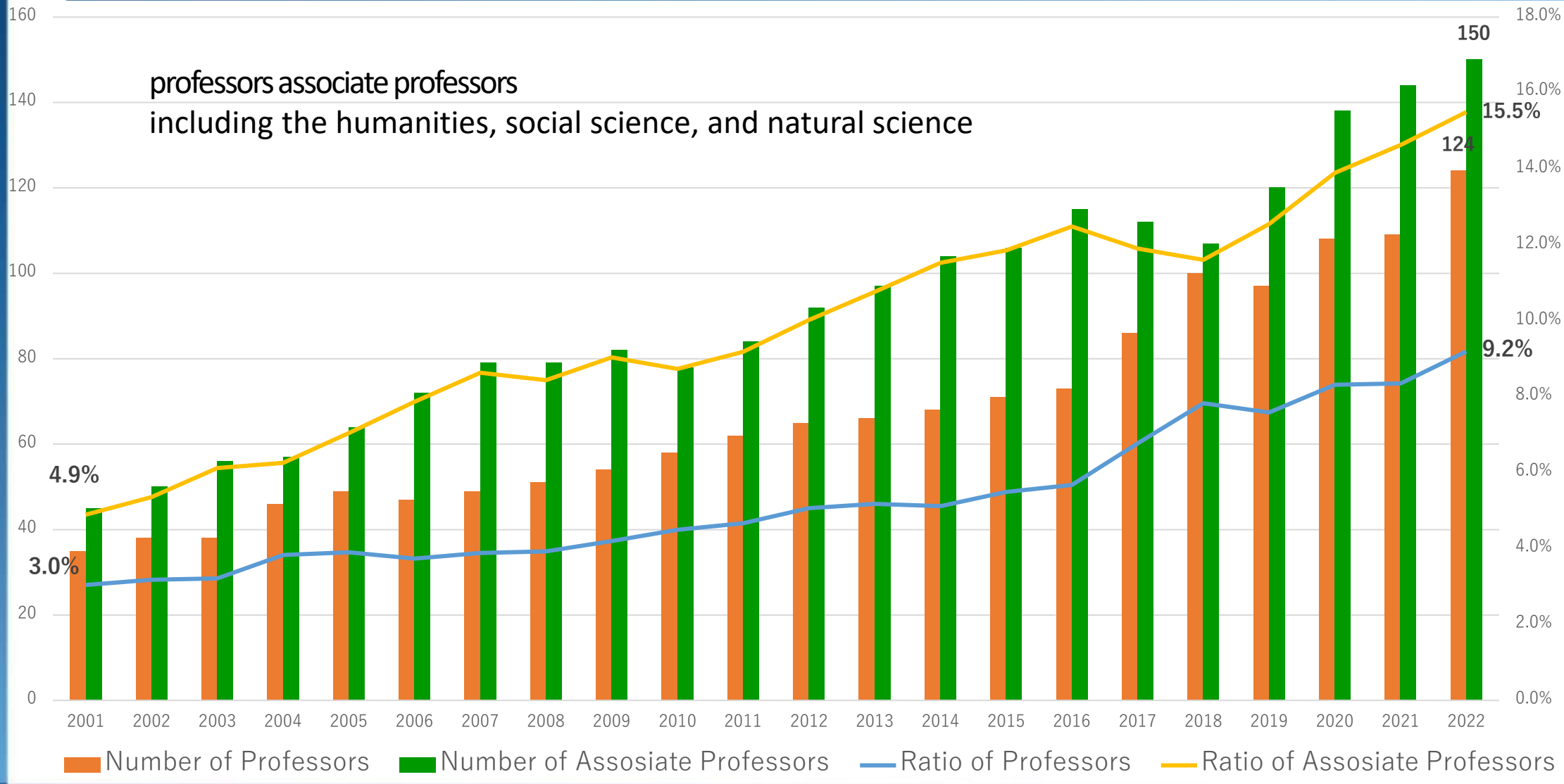
In recent years, the need for engineering personnel has been growing in fields like IT and decarbonization.

There would be many opportunities for women in science and engineering, but not many girls major in science and engineering

the lowest among OECD member countries.

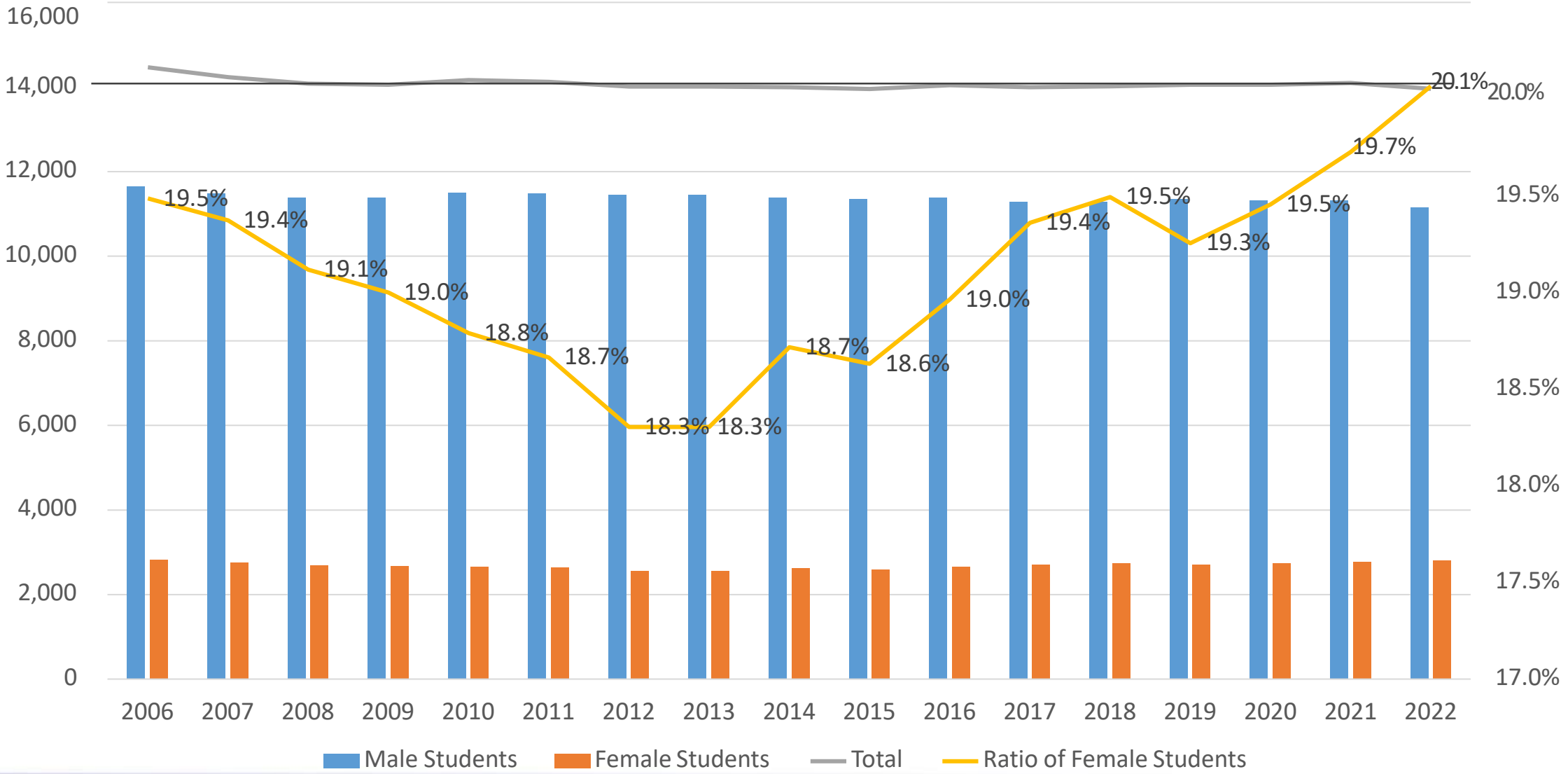
The University of Tokyo

Number & ratio of female faculty members

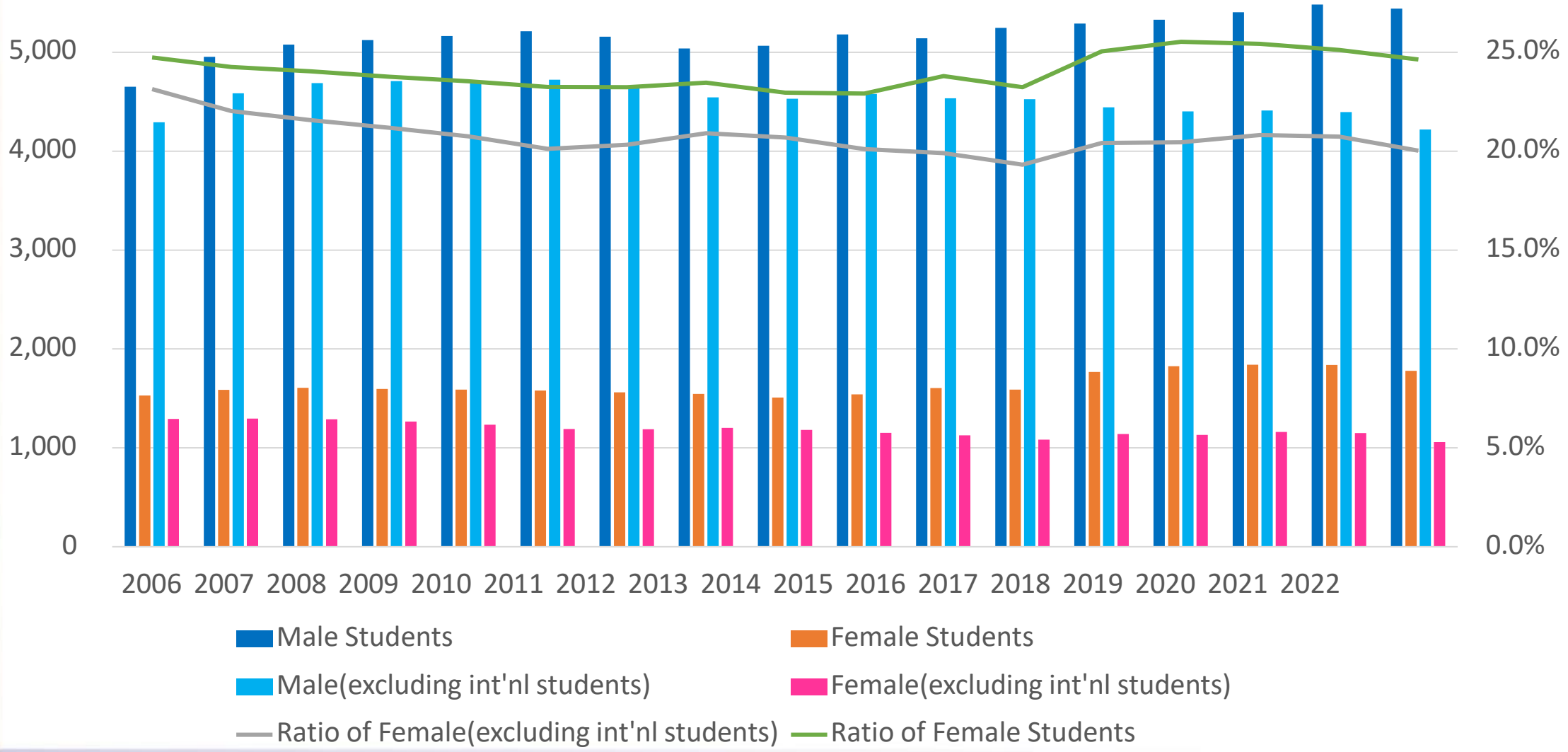


The University of Tokyo

Number of Male/Female students and ratio of Female students at the undergraduate level



Number of Male/Female students and ratio of Female students at the Graduate level



Summary

The gender equality in Japan:

- The ratio of female researchers has been increasing steadily, but it is quite slow.

When you look at the current state in Japan from global point of view,

- The percentage of female researchers in Japan is lowest rank in the OECD countries as well as that of female students in science and engineering.

The University of Tokyo:

- The percentages of female faculty members and female students in both undergraduate and gradate levels are not so high even including the humanities, social science

In order to meet ever-increasing needs for STEM human resources, it is important not only to increase the number of female researchers and students but also to increase the number of women in leadership position.

Initiatives for empowerment of female researchers in STEM fields

Some of practices for empowerment for women in STEM fields

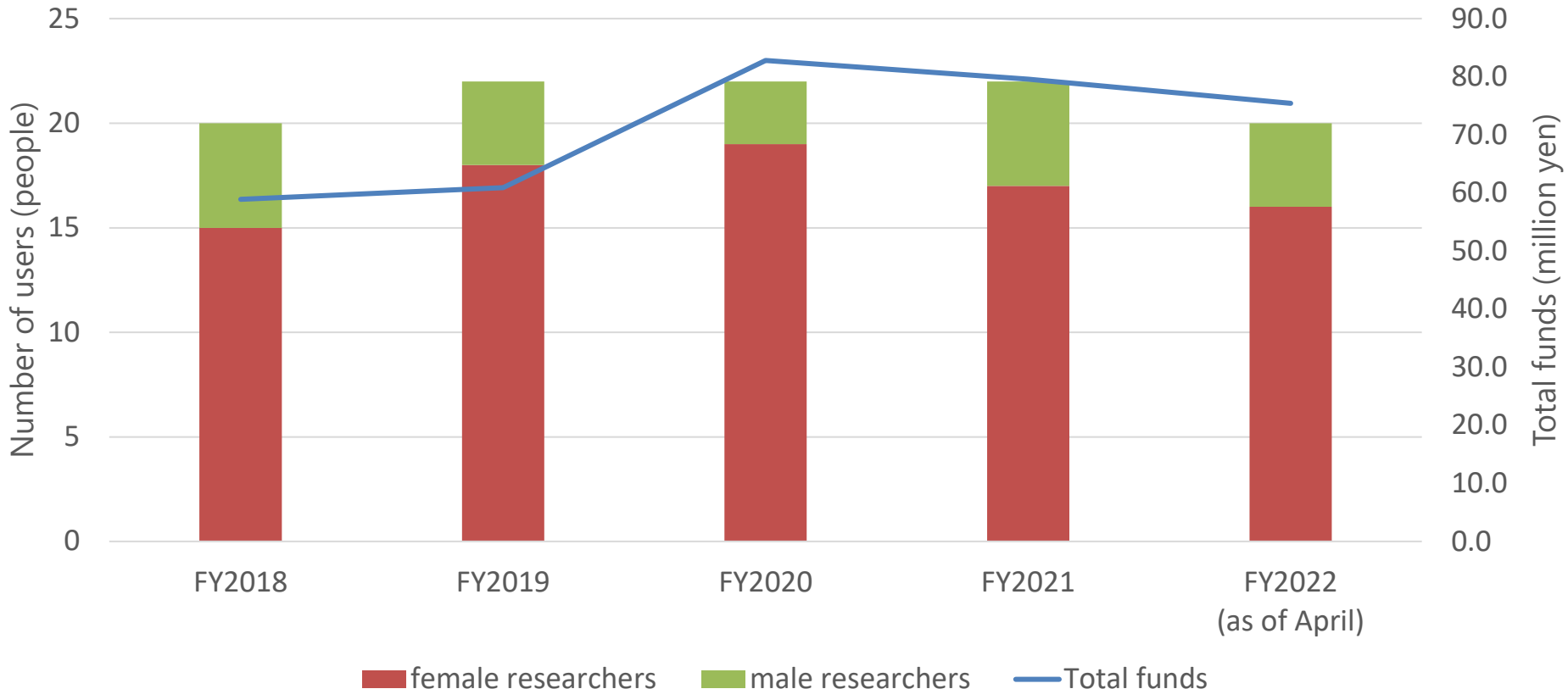
JST:

- Improvement of working environment to achieve work-life balance
- Encouraging female researchers to take a leadership position
- Award for female researchers

The University of Tokyo:

- STEM/STEAM education for young generation

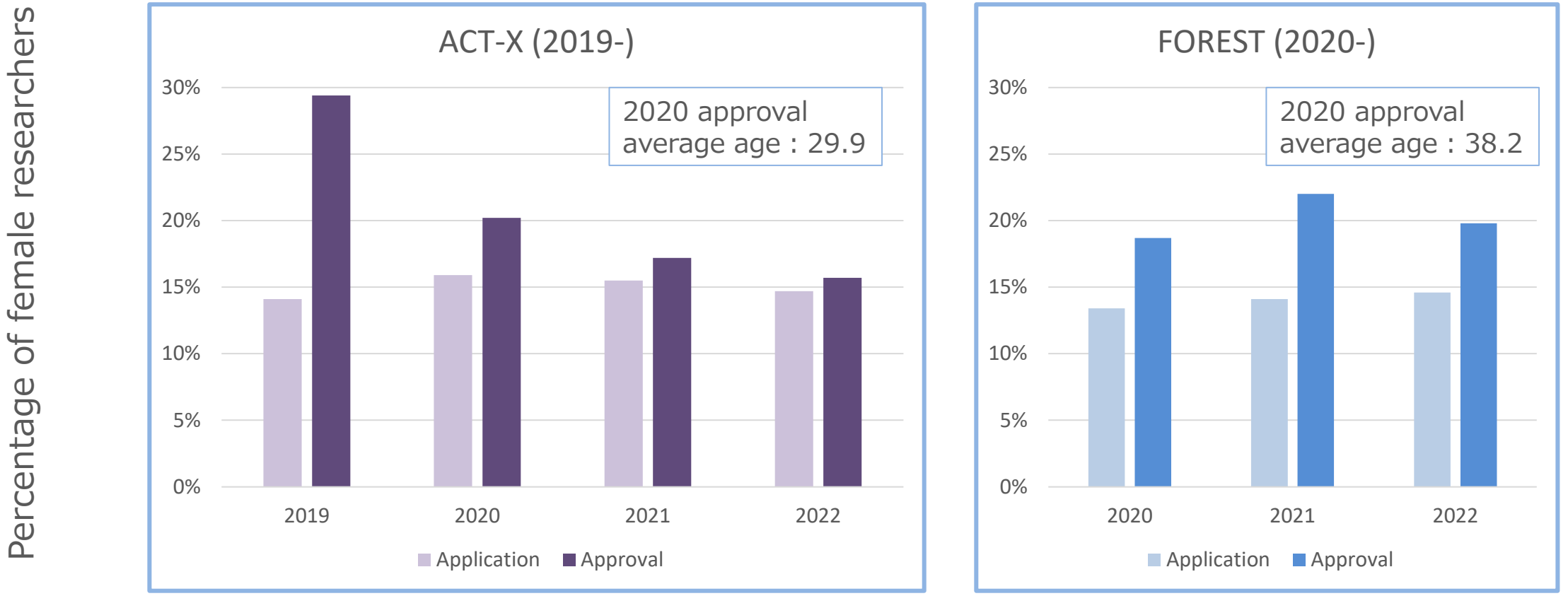
Maternity, paternity, childcare, and nursing care support programs



Research cost allowance
(up to 300,000 yen/month; until their children reach the age of nine)

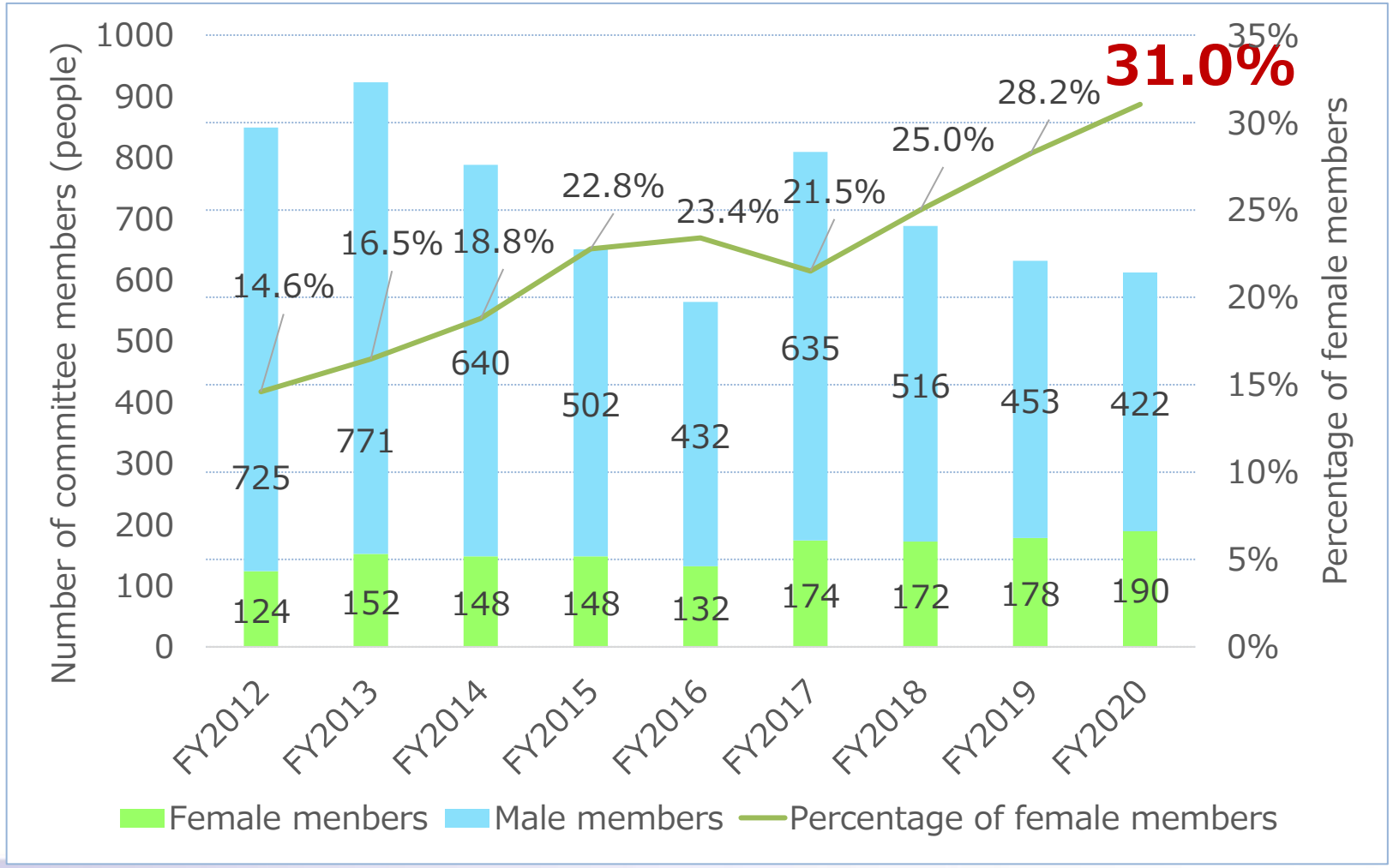
Female Researchers granted by JST's Funding Programs

female researchers' **approval** percentage > application percentage



Percentage of female members in committees, etc. in JST – Trends and initiatives

Goal = 30%



Number of **female chair**

5 chairs in 2013

↓

12 chairs in 2020

Brilliant Female Researchers Award (The Jun Ashida Award) (2019-)

Award for outstanding female researchers (in principle, under 40 years old) and institutions that promote their activities

Awardees 2022

■ **The Award for Brilliant Female Researchers (The Jun Ashida Award)**

Yasuka Toda
Assistant Professor, School of Agriculture, Meiji University
Food science

■ **The Award for an Organization Supporting Brilliant Female Researchers (The Jun Ashida Award)**

Tohoku University (Hideo Ohno President)

東北大学

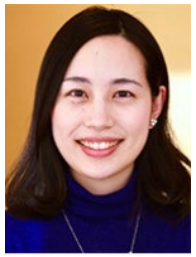
■ **The Award for Brilliant Female Researchers (The JST President Award)**

Kaori Sugihara
Lecturer, Institute of Industrial Science, The University of Tokyo
Biophysical Engineering

The Winners of the First Marie Sklodowska Curie Award (2022)

Award aimed at encouraging young female researchers (late 20's to early 30's) (2022-)

Grand Prize



ICHIKAWA Saki

Postdoctoral Fellow, Department of Chemistry and Chemical Biology, Harvard University

Research field Chemical Biology, Organic Chemistry

Inspiration Prize

KADOWAKI Mariko

Researcher, Research Center for Structural Materials, National Institute for Materials Science (NIMS)

Research field Materials Science

Recognition Prize

SASAMOTO Naoko

Assistant Professor, Department of Obstetrics, Gynecology, and Reproductive Biology, Brigham and Women's Hospital and Harvard Medical School

Specialized field Molecular Epidemiology

Inspiration Prize

MORIYAMA Miyu

Postdoctoral Fellow, Department of Immunobiology, Yale University School of Medicine

Research field Viral Immunology

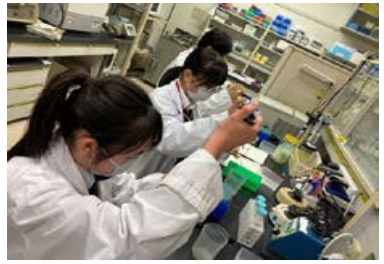
Initiatives for the next generation
Fostering the Next Generation Human Resources – Support for Girl Students in Choosing Science

- Boost interest of middle/high-school girls in science fields
- Promote teachers and parents understanding of female career path in sciences
- Support girls' enrollment in sciences with variety of opportunities (as shown below) offered by executing agencies
- established since FY2009

Supports 16 organizations (as of FY2022: 13 four-year universities, 2 technical colleges, and 1 science museum)

Examples

Offering scientific experiences

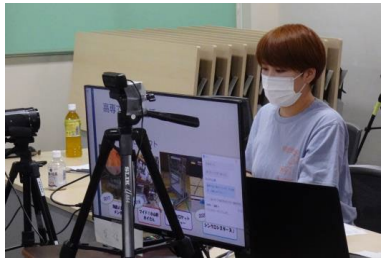


Science Autumn School
By Saitama University

Introducing learning and jobs in sciences

Laboratory Visit
By National Institute of Technology (KOSEN), Hakodate College

Interactions with female role models



Robotics & Career Lecture
By National Institute of Technology (KOSEN), Oyama College

Offering parents and teachers information of career path in sciences

PTA assembly
By Nagasaki University

- **Program Achievement – positive influence on girl students considering their own future regardless of gender**
- **Analyzed the participants' attitude changes from questionnaires conducted by executing agencies, asking participants at each events**

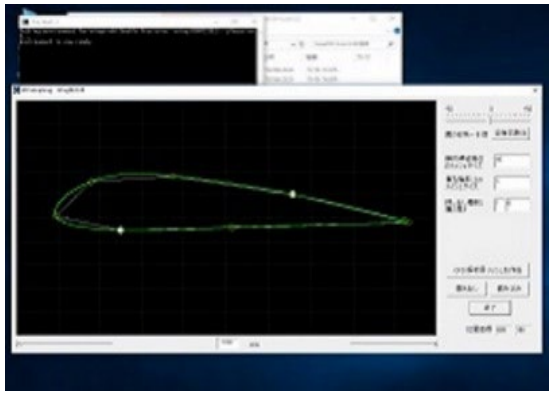
FY2021 Questionnaire Compilation Results	Students undecided their own course (N=1,120)	Students decided to learn in humanities (N=915)
Raised interest in science/technology and sciences and math	84% (n=934)	67% (n=610)
Began to think positively about pursuing a career in sciences	68% (n=757)	29% (n=266)

STEM/STEAM Education

STEM/STEAM (Science, Technology, Engineering, Arts and Mathematics)

- Designing of workshops and development of teaching materials for high school students by collaborating with industries to enhance understanding of cutting edge science and technology
- Development of education programs for young female students to promote awareness and understanding of science and engineering

Workshop Design by collaborating with industry such as JAL (Japan Airlines)



Simulation

Experiment

Learning Media

Teaching materials with lesson plans developed based on the workshop

https://ong.iis.u-tokyo.ac.jp/

Future Perspective

It is important to resolve the gender gap in science and engineering to advance innovation further.

- As a government agency, JST has been improving and reinforcing the environment and support system for empowerment of female researchers in STEM fields.
- JST has been trying to take proactive initiatives for empowerment of female researchers as well as female students.
- STEM/STEAM education is an effective way to motive your girls to go on STEM fields trough experiences to solve social issues.

Thank you for your attention