



## **Absolute numbers of women matter more than proportion for achieving gender equity in STEM**

An international study visually highlights the level of gender equity in STEM fields, aiming to support the development of gender bias-free organizations.

Fukuoka, Japan—A recent study led by Kyushu University, Tokyo Institute of Technology (renamed Institute of Science Tokyo on October 1, 2024), and University of California San Diego has found that focusing only on increasing the proportion of women scholars is not enough to accurately assess gender equity in Japan. Researchers proposed a new evaluation model that incorporates the proportion and total number of women, along with their academic performance, to provide a more comprehensive evaluation and support women's active engagement in academia. Published on October 18, 2024, in [\*International Journal of Educational Research Open\*](#), the study shows that the absolute number of women in science, technology, engineering, and mathematics (STEM) departments significantly influences their research output.

In Japan, despite decades of governmental initiatives promoting gender equity in academia, women in STEM still struggle for equal treatment and recognition. While institutions cite the rising percentage of women as a sign of progress, this can paint an overly optimistic picture. In many cases, these statistics are inflated by the growth in women students or junior researchers, failing to reflect true equality in career progression or work environments. The low representation of women in senior academic positions and decision-making roles highlights the persistent gender bias in academia.

“The fixation on percentages reflects the perspective of policymakers, often men, rather than the lived experiences of women in STEM,” says [Professor Kaoru Tamada](#) of Kyushu University’s [Institute for Materials Chemistry and Engineering](#), and the lead author of the study. “What truly matters to women is the number of peers they can collaborate with daily. We need to create frameworks that truly support women.”

To address this gap, Tamada and her colleagues developed a quantitative evaluation method called the Academic Gender Equity Index (Academic\_GEI). This index evaluates academic performance of women researchers within schools, departments or institutes while considering the proportion and absolute number of women faculty.

The team utilized three metrics in their system: the total number of women faculty members, the proportion of women, and their academic output. Under Academic\_GEI, an ideal gender-neutral situation would show men and women researchers performing equally in terms of research output. When applying it to various academic institutions across Japan, the United States, and Europe, the team found that while in western institutions women researchers typically match their men counterparts in research output, Japanese universities demonstrate greater variability.

In Japanese academia, women faculty members either perform below average or outperform

their peers. Researchers attribute the former to hiring practices aimed at boosting women ratios by recruiting young, less experienced women. “The latter points to a systemic undervaluation of women in STEM recruitment, where they often must significantly outperform men to receive equal recognition in Japan,” says Tamada. Thus, neither scenario reflects gender equity.

The study concludes that traditional metrics focusing solely on the proportion of women in faculty positions show little correlation with women's academic performance. Alternatively, the total number of women faculty in each research unit significantly influences research output. A greater number of women colleagues fosters a supportive environment, enabling women to build networks, advance their careers, and achieve higher and more stable results. This leads to greater gender equity, which is crucial for ensuring diversity and integrating gender perspectives in science and technology innovation.

Going forward, Tamada and her colleagues plan to expand their research to include regional and private universities in Japan, and exchange information internationally. By gathering more data, they will continue refining these indicators.

As a woman in STEM, Tamada is focused on building an equitable academic environment that promotes innovation and encourages women's contributions. “Academia nurtures future generations. As specialists in science, we have both the ability and the responsibility to tackle societal problems through academic methods, and to create a gender neutral environment for the next generation,” she says.

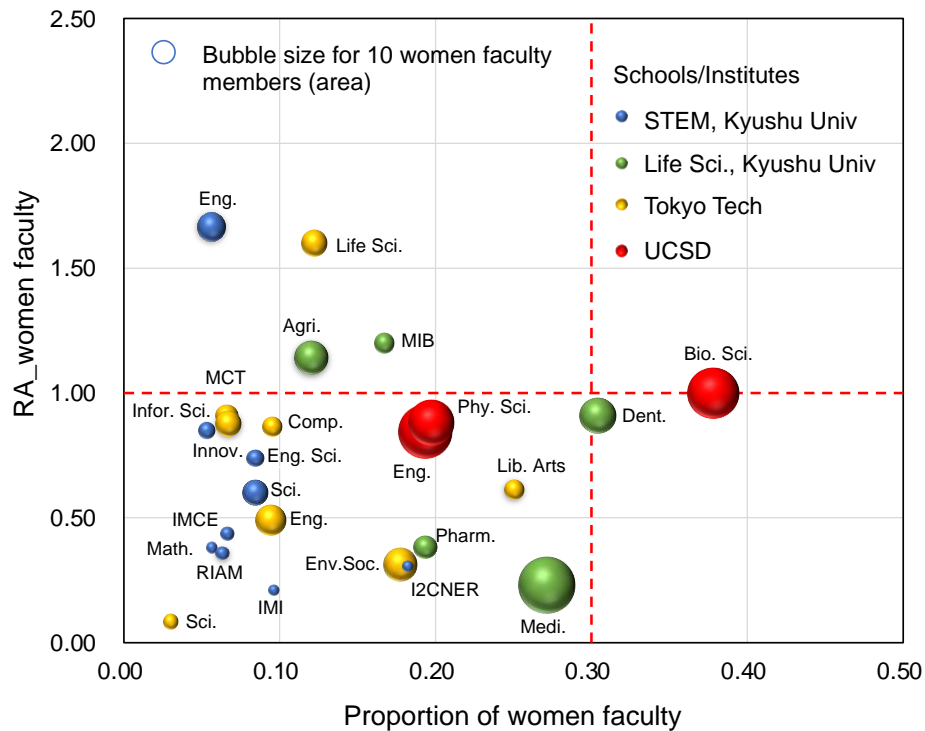
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For more information about this research, see “Evaluation of the Gender-Neutral Academic Climate on Campus for Women Faculty in STEM Fields,” Kaoru Tamada, Eriko Jotaki, Naoko Tsukamoto, Shoko Sagara, Junko N. Kondo, Masao Mori, Miwako Waga and Sandra Brown, *International Journal of Educational Research Open*, <https://doi.org/10.1016/j.ijedro.2024.100390>

## **About Kyushu University**

Founded in 1911, [Kyushu University](#) is one of Japan's leading research-oriented institutes of higher education, consistently ranking as one of the top ten Japanese universities in the Times Higher Education World University Rankings and the QS World Rankings. The university is one of the seven national universities in Japan, located in Fukuoka, on the island of Kyushu—the most southwestern of Japan's four main islands with a population and land size slightly larger than Belgium. Kyushu U's multiple campuses—home to around 19,000 students and 8000 faculty and staff—are located around Fukuoka City, a coastal metropolis that is frequently ranked among the world's most livable cities and historically known as Japan's gateway to Asia. Through its [VISION 2030](#), Kyushu U will “drive social change with integrative knowledge.” By fusing the spectrum of knowledge, from the humanities and arts to engineering and medical sciences, Kyushu U will strengthen its research in the key areas of decarbonization, medicine and health, and environment and food, to tackle society's most pressing issues.

## UCSD vs. Kyushu Univ. and Tokyo Tech (Schools/Institutes)



**Fig. 1. Comparison of STEM and Life Sciences Departments in Japanese and U.S. Universities Using the Academic Gender Equity Index (Academic\_GEI)**

In the bubble chart, the horizontal axis shows the proportion of women faculty members, while the vertical axis represents research performance of women faculty members versus that of all faculty members (with 1.0 meaning no difference between men and women). The size of each bubble represents the number of women faculty members in the Schools/Institutes. At UCSD, not only is the proportion of women faculty more than double that of Japan, but there is also no significant difference in research performance between men and women.

[Contact]

Kaoru Tamada, Professor

Institute for Materials Chemistry and Engineering

Tel: +81-92-802-6230

E-mail: tamada@ms.ifoc.kyushu-u.ac.jp