



Clean-room workers prepare a satellite for a joint mission between NASA and the Indian Space Research Organization.

MARIO TAMAI/GETTY IMAGES

## India steps up as US research seeks collaboration reset

Mutually beneficial connections are forming between the countries, despite bureaucratic hurdles. **By Natasha Gilbert**

**A**chyuta Adhvaryu, an economics and public-policy researcher, moved across the United States from Michigan to San Diego this year, to launch the 21st Century India Center at the University of California (UC), San Diego.

The centre aims to foster new connections between researchers at the university and academics at top institutions in India, an often-difficult task, says Adhvaryu, given India's sprawling higher-education system comprising roughly 50,000 academic

institutions. By funding trips and organizing meetings, staff at the centre act as intermediaries, helping to facilitate relationships that might not have formed organically. An ocean scientist at UC San Diego's Scripps Institution of Oceanography, for example, has engaged the centre to connect them with researchers in India to work on a project about sea-level rise in the Indian Ocean.

The centre was established in light of India's growing economic and scientific prowess, says Adhvaryu. "There is an obvious need

for research and policy to come together on United States and India relations," he says.

As opportunities for new research partnerships between the United States and China wane owing to heightened political tensions, US institutions are looking elsewhere for collaborations. India has become an increasingly popular source of international students and research partnerships for the United States, but strengthening collaborations between the two countries brings new challenges. Institutions are navigating significant structural and

cultural differences in the countries' higher-education systems, as well as regulatory and policy hurdles.

To forge sustainable alliances, governments in both nations must reform regulations that impede collaboration and faculty exchanges, says Heidi Arola, assistant vice-president for global partnerships and programmes at Purdue University in West Lafayette, Indiana. Scholars and students also need to see the value in these cross-border connections, such as by studying successful examples of US and Indian researchers working together. "Institutional partnerships are about relationships between people, and not between entities," says Arola.

India and the United States have much to gain from teaming up, and their shared democratic ideals and respect for academic freedom makes them natural partners, says Diya Dutt, who advises the Association of Indian Universities in Delhi on international collaborations. With some 38 million students, India is an abundant source of bright young minds, especially at a time when the United States is experiencing waning interest from Chinese students. By gaining access to world-leading infrastructure and scholarly forums in the United States, India can further strengthen its research and higher-education sectors, says Adhvaryu.

India's growing scientific prowess also means that its contributions to international collaborations are likely to become more significant than they have been in the past, says Dutt. In 2019, for example, India replaced Germany as the fourth-most productive country by the total number of research publications per year, according to Elsevier's Scopus database. And in the Nature Index, India's adjusted Share in the natural sciences rose by 5% between 2021 and 2022, placing the country among the leading ten nations in that subject area for the first time.

### Growing role

The impetus to strengthen ties between the United States and India was given a push in May last year, when the US President, Joe Biden, and India's Prime Minister, Narendra Modi, announced a joint initiative to boost research collaboration in space, defence and new technologies. It includes an agreement between the US National Science Foundation and Indian science agencies to launch 35 jointly funded programmes in areas including artificial intelligence and quantum technologies. It will also expand an exchange scheme through which US and Indian scientists and engineers who are engaged in military and space research can spend time working in each other's government organizations.

The initiative shows that both governments

are serious about science partnerships and could encourage higher-education institutions to build their own bridges, says Philip Altbach, emeritus professor at Boston College in Massachusetts, where he studied global higher-education systems. India has typically preferred to focus its research efforts within its own shores, influenced by a 'do-it-yourself' ideology, but is becoming more outward looking, says Altbach.

In 2020, for instance, the Indian government launched an education strategy that promotes international collaboration. Part of this strategy is to merge, by 2040, higher-education institutions that were established according to discipline into multidisciplinary universities, says Shakila Shamsu, a former officer of India's Department of Higher Education, who co-authored the education strategy.

The strategy aims to increase funding for education from roughly 3% of India's gross domestic product (GDP) to 6%, and to build links and programmes with overseas institutions to make India a global destination for foreign students and faculty members, says Shamsu. It has also laid the groundwork for overseas universities to open campuses in India. Two Australian institutions, Deakin University and Wollongong University, announced earlier this year that they will be the first institutions to take advantage of this reform.

Large-scale changes will take time, says Shamsu, but some progress is already being made. In August, the Indian Parliament approved a recommendation by the 2020 National Education Policy for a new National Research Foundation that will sit in the Department of Science and Technology and allocate 500 billion rupees (US\$6 billion) to research over five years from both public and private sources.

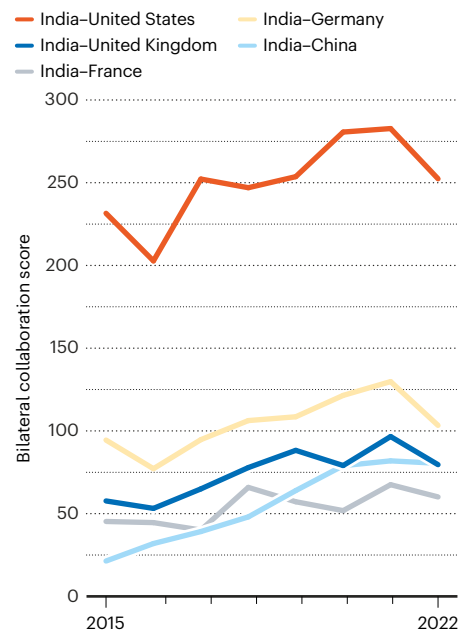
Substantial differences remain between the research and education systems in the United States and India that threaten to hamper collaboration, however. Decades of underfunding has left India without a world-class university, despite the size of its education system, says Dutt. In the Nature Index, India has only one university among the leading 150 academic institutions globally for the natural sciences: the Indian Institute of Science, in Bengaluru, ranked 122nd in 2022. The country invests less than 1% of its GDP in research and development, much less than China (2.4%) and the United States (3.4%).

Financial constraints mean that most researchers lack equipment and other infrastructure needed to carry out groundbreaking research, says Altbach. "They are just not prepared for global collaboration," he says.

New models for collaboration backed by generous funding could help to overcome these

### COUNTRY CONNECTIONS

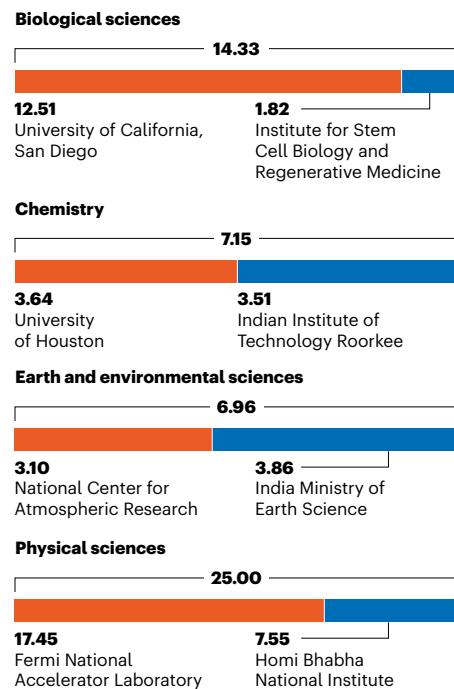
India's partnership with the United States is by far its most productive, with more than double the bilateral collaboration score for 2015 to 2022 than its partnership with Germany. Its collaboration with China is rapidly gaining steam, increasing by 276% over the same period.



### STRONG PAIRS

The most productive US-India collaborations in the Nature Index are shown in four subject areas. The Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois, is a particularly strong partner for Indian research, being part of six of the ten leading US-India collaborations in the natural sciences overall.

Leading collaboration scores between institutions in the United States and India by subject area, 2015-22





obstacles, says Arola.

In September, the Council of Indian Institutes of Technology, which governs 23 Indian Institutes of Technology, and the Association of American Universities (AAU), an organization that comprises 65 leading US universities, announced that they will establish an India-US Global Challenges Institute, with an initial combined budget of at least US\$10 million. The institute will bring together leading research and higher-education institutions from the two nations in a virtual network to collaborate on joint research programmes to address challenges that could affect the security, prosperity and stability of both countries, the AAU said in a statement. The idea for the institute was proposed in a report published by the AAU in June. Arola, a co-author of the report, says the success of the initiative depends on securing sufficient long-term funding. “Funding commitments need to be large enough to make an impact,” she says.

### Virtual network

A major barrier to scientific collaboration between India and the United States is regulatory bureaucracy. Lengthy backlogs in visa processing at the US Department of State has left Indian academics waiting for more than 12 months to enter the country, says Arola. Such delays make it difficult for researchers in India to participate in scientific meetings and conferences held in the United States and will impede the smooth running of research partnerships, she says. The AAU report welcomes promises from US consulates in India to issue one million visas to Indian citizens in 2023 and to reduce wait times for student visas. It urges the state department to begin a month-long ‘sprint’ of visa-processing to ease its logjam and suggests that the United States pass legislation to overhaul its immigration systems.

Maintaining diplomatic relations between the world’s largest democracies is a balancing act, one that recent tensions between Canada and India have emphasized. Allegations by Canada that India was involved in the June killing in British Columbia of a Canadian citizen linked to the cause of Sikh separatism have led to the rapid deterioration of relations between the two nations.

Universities have challenges, too. Altbach says the Indian government must give foreign universities greater clarity around rules associated with setting up campuses, ownership of intellectual property and compliance measures, such as tax filings. Some US institutions have managed to navigate these difficulties through long-standing partnerships with Indian counterparts. A partnerships scheme that Arola coordinates between Purdue University and



India’s Prime Minister Narendra Modi and US President Joe Biden at a meeting in June.

CHRIS KLEPONIS/CNP/BLOOMBERG VIA GETTY IMAGES

Indian institutions, for example, is a decade old. Through an agreement with India’s former Science and Engineering Research Board – a science agency that will be subsumed into a new National Research Foundation – the university offers one-year doctoral exchanges to top PhD students from India, with funding from the Indian government. In addition, US and Indian faculty members who work with the students are given funding to visit each other for up to four weeks to deepen connections between research groups.

### “The groundwork for future healthy international relationships must start with educating Americans about India.”

Purdue University also establishes bilateral agreements with institutions in India, including the Indian Institute of Science and Andhra University in Andhra Pradesh, to collaborate and build expertise in areas such as renewable energy and the pharmaceutical sciences. These relationships have helped Purdue University to grow its faculty with Indian origin to 265 and its cohort of Indian students to more than 2,000, representing the university’s largest group of international students.

Institutions that are looking to form international partnerships with Indian scholars should assign a “designated worrier” to keep activities on track, Arola suggests. Joint programmes

and projects have many moving parts involving busy people and competing priorities, so it’s important that someone is in charge and accountable, she says.

Choosing the right institutional partner is also crucial. Purdue University receives many “cold calls” from Indian institutions that it has little in common with, says Arola. If partner institutions don’t have compatible goals, then these relationships tend to fade away, she says.

The groundwork for healthy international relationships must begin before research careers are even forged, starting with educating American students about India, says Dutt. Through the 21st Century India Center, Adhvaryu is planning to support faculty members with incentives and grants to create more content about India in economics courses. Courses often use examples of US enterprise to illustrate lessons about markets and innovation, but Adhvaryu says these could be replaced with current case studies from India. He hopes that this will help to ignite students’ interest in the country.

It’s not just research and higher education that will benefit from greater collaboration, however. It’s a politically savvy move, too, says Dutt. “In today’s uncertain and volatile world, building closer understanding between nations through working, studying and living together is a better way to resolve differences and disputes,” she says.

Arola agrees: “We have much to learn from one another.”

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