

Commentary

Breaking the spell of scientific isolation in the developing world

Scientific work in a developing country is fraught with all kinds of difficulties that many readers in richer countries won't even hear of in their lifetimes. I am currently a physics professor in Pakistan, and my peers and I face many challenges because of the country's economic position and political caprice.

Such difficulties manifest in different forms. Supplies and equipment come with additional overheads related to freight costs and customs and import duties. Travel advisories and the prospect of leaving behind families to visit presumably adverse environments discourage equipment manufacturers from traveling. Obtaining visas can be slow, and travel, of course, remains expensive. There are also the challenges of sanctions, political turmoil, cultural taboos, language barriers, lack of access to literature, literacy gaps, long power outages, and outright absences of electricity and the internet.

Still, against the backdrop of those difficulties, committed scientists living in developing countries vie to produce new knowledge and participate in the global expedition of scientific discovery. Against the odds, they strive to build new instruments, explain confounding natural processes, and find new ways to tackle diseases—and in the process, attempt to bring down the barriers that have held their populations back in the first place. And that is while they want to be true equals in the global scientific mission.

But lack of contact with peers, little funding, and unattractiveness to foreign scholars to visit perceivably uncomfortable or dangerous environments can quickly downgrade the drive for excellence into a mere desire to cling to mediocrity. The Nobel laureate Abdus Salam said that he had to leave his country, Pakistan, to remain a physicist.¹

Thanks to the opportunities ushered in by the digital revolution, however,



THE AUTHOR (squatting), science communicators, and children from the village of Bua in the Narowal District of Pakistan pose in front of the Khwarizmi Science Society's Large Hadron Collider Interactive Tunnel during one stop on its tour around the country. The society re-created the original LHC tunnel in collaboration with CERN's Media Lab in 2019.

there is hope that the vicious circle of scientific ghettoization can be broken and scientific pursuit can catch up with the enormous strides made toward cultural globalization.

In a commentary published in *PHYSICS TODAY* (April 2016, page 10), the Canadian physicist Barry Sanders encourages his readers to wholeheartedly accept invitations to speak in the developing world. He enumerates many benefits for the invitee, such as the opportunity to experience new cultures, recruit and identify

potential students and postdocs, and inspire budding scientists. Such benefits to the invitee are truly priceless. But as a host in the developing world, I'll say that the interactions can be true game changers for those of us in the inviting countries as well.

Physically seeing, meeting, listening to, and talking with world-renowned educators and scientists can have a lasting impression on our students' scientific worldview. Eminent scientists can have large fan clubs in the hosting countries,

thanks to digital dissemination and popular accounts of their scientific work, and our students and early-career scientists always love to meet members of the community they already admire. For several years I helped organize the Abdus Salam Memorial Lecture Series, which brings scientists of global preeminence to speak about contemporary physics at my university in Lahore.

The encounters can also be purely digital, an experience that has become mainstream since the onset of COVID-19. For example, my university's mathematics department routinely organizes talks as part of the digital John Conway Spirited Mathematics Seminar Series, which brings the best mathematicians from around the world to speak in a virtual setting with anyone who would like to attend.

Such interactions open the door to new scientific questions and expose students to fascinating areas of research or exciting problems to calculate. Stirring conversations can solidify into long-term studentships and academic collaborations. Several of Sanders's students and post-docs have been scouted from his trips to "far-off" countries. Some of those students have now become outstanding educators and researchers in their home countries and help in the transnational pollination of scientific ideas.

Not only do international visitors present their research in specialized conferences, but they also provide the service of popularizing scientific knowledge. In my view, it's far more productive to intersperse research presentations with expository tutorials and public lectures, as people's appetites for advanced technical details can be far exceeded by their

innate desire to be motivated and to be inspired. The Khwarizmi Science Society is a grassroots scientific movement I have been working with for the past 25 years. The society organizes the Lahore Science Mela, a festival that attracts thousands of students, children, and citizens to a temporary scientific wonderland. One of the highlights has been the Large Hadron Collider Interactive Tunnel, built by the society in collaboration with CERN's Media Lab. The lab's João Pequeno flew in from Geneva and directed the enactment of a theatrical performance that used the tunnel to teach visitors about particle physics, antimatter, the Higgs field, and gravity. His brief stay in Lahore has sparked the society's plans to tour remote towns and conduct road shows for thousands of eager schoolchildren.

Through introductory workshop-style interactions, visitors can even lay the foundation for new disciplines inside host countries. The International Iran Conferences on Quantum Information have brought together experts from around the world and played a vital role in bolstering Iran's position in the field of quantum information and computation. Vietnam's International Centre for Interdisciplinary Science and Education, which organizes workshops on diverse topics, draws international visitors and has helped the country emerge as a regional powerhouse of physics and mathematics. The African School of Fundamental Physics and Applications orchestrates fundamental training programs in African countries and holds conferences where international experts converge and contribute to elevating scientific understanding.

Some institutions, such as the Abdus Salam International Centre for Theoretical Physics and the World Academy of Sciences, have made it part of their purview to connect scientists from the developing and the developed worlds. But the most potent form of advertisement is the individual scientist in a developing country who extends and strengthens existing connections with Western mentors and invites them to become the seeds of change.

At times, partners between hemispheres have built entire institutions. At

present I am dean of the Syed Babar Ali School of Science and Engineering at the Lahore University of Management Sciences. The design of the school, which is a startup experiment inside a university, owes its form to an international advisory board consisting of members from academia and industry. No one urges James Westcott, the current chair of the board and a professor at MIT, to spend time advising the school's nearly 100 faculty members, all trained at the best universities in the world, on their academic programs and the investments they should make. It's only the inner calling of Westcott and the other board members, who do not hesitate to visit our school in Lahore every spring, that pushes them to shape the future course of a thriving scientific ecosystem.

The global scientific enterprise can become an embodiment of international cooperation and can stand in the way of hegemony, imperialism, and war. That will require humanity to achieve its best virtue, which is that of sacrifice—namely, sacrificing time to ensure everyone is an equal in the global scientific mission.

Reference

1. A. Salam, in *One Hundred Reasons to Be a Scientist*, Abdus Salam International Centre for Theoretical Physics (2004), p. 29.

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LETTERS

Once a physicist . . .

I appreciated Charles Day's introduction to PHYSICS TODAY's most recent careers issue (October 2021, page 8). I am always delighted to see attention drawn to the wide range of satisfying careers that can be entered with a physics degree.

The "Spotlight on Hidden Physicists" series in Sigma Pi Sigma's *Radiations* magazine is very special to me as a matter of inclusion and personal perspective. I vividly recall reading letters in PHYSICS TODAY around the time of the cancellation of the Superconducting Super Collider in

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