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The transformation of girls' education

In a country where the phrase "*Beti padhegi toh kya karegi?*" (What will a daughter do if she studies?) once echoed through homes and villages, India has undergone a powerful transformation in girls' education over the past decade.

At a *Mahila Sammelan* (Women's Conference) in Dwarka, Gujarat, Prime Minister Narendra Modi asked a group of women how many had studied beyond class 5. To his surprise, most of the elderly women raised their hands, while few younger women did. When asked why, they pointed to the era of the Gaekwad dynasty (1721-1947), when fathers were penalised for not educating their daughters. Today, however, many women are literate, while their daughters-in-law are not.

This anecdote underscores a larger truth: good intentions must be backed by accountability, leadership, and policy. And under Mr. Modi's leadership, India is witnessing just that – a systemic push to change not just rules, but mindsets. This transformation is not just about more girls in classrooms; it's about shifting the very foundations of Indian society, its health, economy, and demography, by empowering its daughters with the most effective tool of change: education.

The Gujarat model

As Chief Minister of Gujarat, Mr. Modi recognised that tackling issues such as female foeticide and girls' illiteracy required a multi-pronged approach. Laws alone wouldn't suffice; a fundamental shift in public perception, supported by infrastructure and incentives, was required. Launched in 2003, the Kanya Kelavani campaign became a key vehicle for this change. The initiative promoted awareness about girls' education while addressing barriers such as the lack of separate toilets for girls in schools, a major cause of dropouts during adolescence.

The results were significant. Female literacy rate in Gujarat



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which was lower than the national average, increased to 70%, higher than the national average of 64%. The school dropout rate reduced by as much as 90% among female students in targeted districts.

Mr. Modi transformed the policy initiative through widespread public support, by personally auctioning gifts received at public events, raising ₹19 crore for girls' education. He also made a personal contribution of ₹21 lakh. These efforts sent a strong signal: girls' education wasn't just a government scheme, it was a public movement.

Scaling success nationwide

Inspired by Gujarat's success, the Beti Bachao, Beti Padhao (BBBP) initiative was launched nationwide in 2015. Its aim was twofold: to prevent female foeticide and promote girls' education. The initiative focused on 100 gender-critical districts in its initial phase and later expanded nationwide. It brought together multiple ministries – Women and Child Development, Health and Family Welfare, and Human Resource Development – in a coordinated push for change. Among other measures of outcome, its impact is most visible in the survival rate of girls. India's sex ratio at birth improved from 919 girls per 1,000 boys (2015-16) to 929 (2019-21). Encouragingly, 20 out of 30 States/UTs are performing better than the national average of 930.

But these improvements in sex ratio at birth are encouraging, they are just one piece of a much larger puzzle. The real power of girls' education lies in the ripple effects it triggers across society. Educated women tend to marry later and have fewer children. India's Total Fertility Rate has dropped to 2.0, just below replacement level. This shift is closely tied to rising female education and workforce participation. Women with secondary education are more likely to seek institutional deliveries and prenatal care. The

Infant Mortality Rate for girls has dropped from 49 per 1,000 live births in 2014 to 33 by 2020. While overall female labour force participation remains a challenge, it is rising in sectors such as healthcare, education, STEM, and entrepreneurship – fields that thrive on literacy and skills. From officers in the armed forces to CEOs of tech startups, today's educated Indian women are breaking barriers.

The multiplier effect

Educated girls grow into educated mothers – and that changes everything. Studies show that children of educated mothers perform better in school and experience better health outcomes. In Madhya Pradesh, recent surveys show that 89.5% of people are aware of BBBP, and 63.2% say it directly encouraged them to send their daughters to school. Communities reported increased support for delaying early marriage and promoting girls' higher education. These statistics reflect changing mindsets in regions where girls were once kept from schools entirely.

This transformation is a deep-rooted change facilitated by thoughtful and effective policies aimed at empowering young women. The long-term impact of these initiatives will be even more pronounced because of the positive feedback cycle that enhances not only individual lives but entire communities. Today's educated girls are not merely students; they are potential leaders, advocates, and change-makers of tomorrow. Educated girls are more likely to join the workforce, contribute to their families' incomes, and invest in the education of their children.

As we look to the future, we can be hopeful that the changes initiated under Mr. Modi's leadership will continue to gain momentum, leading to a more equitable society where every girl has the right to learn, grow, and thrive. Let's be clear: when you educate a girl, you save a society.

The Beti Bachao, Beti Padhao initiative has shown significant results in the last decade

Chance to make H-1B curbs irrelevant

India can't afford to ignore the basics if it wants to become a leader in technology development



DINESH C SHARMA
SCIENCE COMMENTATOR



OFFSITE: Indian outsourcing firms provide IT services to US banking, finance, insurance and healthcare sectors. **SURABH**

US President Donald Trump recently signed a proclamation titled 'Restriction on Entry of Certain Non-immigrant Workers', imposing a \$100,000 fee on H-1B visa applications filed on behalf of workers currently outside America. The order will remain valid for 18 months — and it may be extended.

The sudden announcement created panic among H-1B visa holders who were travelling outside America. Many took flights to return immediately before the rule came into force. Then, the White House clarified that the restriction did not apply to current H-1B holders or to applications filed before the specified date. It also said that case-by-case exemptions may be granted if the hiring was considered in the national interest or posed no threat to American welfare or security. The White House fact sheet said the new measure was necessary to curb abuse of the H-1B programme, prevent displacement of American workers and reinforce wage protections.

The decree is likely to impact American companies, particularly in technology, finance and consulting sectors, which rely significantly on H-1B visas to bring in specialised skills in software engineering, data science, etc. Large companies will either relocate some roles overseas or hire more domestic graduates. They might encourage remote work so that talent remains outside America but can still contribute to US-based projects. Technology companies are assessing the damage the new measure can cause.

Tech stocks on Wall Street have

remained relatively steady in the immediate aftermath, with only some companies heavily dependent on H-1B labour under pressure. In the long run, if key technical roles become costlier to fill, innovation cycles may slow down.

Although the initial reaction to the Trump move in India was that of extreme shock, subsequent clarifications have brought much relief to IT services companies that cater to American clients. Typically, Indian outsourcing firms provide IT services to the American banking, finance, insurance and healthcare sectors. They do this both onsite (posting Indian engineers to work with clients in America) and offsite (employing engineers in India to work for American clients). Large services and development projects usually have both onsite and offsite components.

When the data communication infrastructure was not developed in India and Indian firms were yet to gain the confidence of their clients in the 1980s, all the work used to be done onsite. Groups of Indian engineers would go to America and work with the clients there — a practice known as 'body shopping.' Indian firms have come a long

We need enhanced
and focused
investment in
fundamental research
in universities and
research institutions.

way, progressively reducing the proportion of onsite work. The new visa rule could bring down onsite work to a bare minimum. In any case, the number of H-1B employees is only a fraction of the total headcount of the Indian IT industry. So, the overall impact is going to be marginal.

As American and Indian firms adjust their strategies following the new visa rules, the larger questions relate to the future of the Indian talent pool in STEM (science, technology, engineering and mathematics) streams. Given the large number of graduates, postgraduates and doctorates Indian universities and col-

leges produce in STEM, India has become a favourite hunting ground for the recruitment of talent for American companies.

In the 1960s and 1970s, the talent from IITs and other elite institutions used to migrate to America, as Indian graduates did not have suitable opportunities here, and America welcomed them with open arms. Over the decades, many of these graduates have reached top positions in leading US corporations, universities and research laboratories.

Now, global companies hire Indian talent for their engineering, R&D and technology development centres right in Bengaluru, Hyderabad and other hubs. No doubt, cost arbitrage has always been a significant factor, but now corporations are hiring in India for the quality of the workforce and scale as well. Even large pharmaceutical, aerospace giants and automobile firms are setting up centres in India to take advantage of the Indian STEM pool. This explains the boom in R&D outsourcing from India and the establishment of mega development centres by top tech firms such as Google, Amazon and Meta in Indian cities.

The Indian STEM pool is generating patents, new processes, products and semiconductor designs for their parent companies while working for American and European firms operating from Bengaluru, Hyderabad, Mumbai, Noida, etc. This is great as it generates high-class employment, brings foreign investment and contributes to the development and growth of the tech ecosystem. However, it is the same talent pool which is critical for India to gain an edge in technology and innovation.

The benefits of the intellectual property generated by Indian techies in India centres of MNCs accrue to the parent companies. The same STEM pool can help generate patents and wealth for Indian corporations, provided they are willing to invest in R&D. India spends less than 1 per cent of its GDP on R&D, and the share of the private sector is skyrosal.

As we move ahead, the quality of the STEM workforce also becomes critical. A study has found that fresh engineering graduates in China and America have a big head start over those from India and Russia in terms of critical thinking. Chinese graduates also have better skills than their counterparts in India and Russia in maths and physics. Such a comparatively poor show of Indian engineers may be due to an overemphasis on rote academic learning at the expense of higher-order cognitive skills, the study has concluded.

If India aspires to be a leader in technology development, as is often projected in the rhetoric of government officials, it can't ignore the basics. We need enhanced and focused investment in fundamental research in universities and research institutions, private sector investment in R&D, improvement in the quality of education in elite and non-elite educational institutions and a clear pathway to develop quality STEM manpower for the benefit of India. This is the only way to make blips like the H-1B curbs irrelevant. *2/6*

Why Punjab needs a public library law, urgently



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Ideas, wisdom and all that is good in the world? No wonder our youth have spent their leisure time in dens of drug addiction or led to greener pastures.

Literature and culture are mutual enemies. No wonder, we have lost the finer nuances of our culture.

Not that the state did not have a vision for this. In 1948, the Punjab Library Association (PLA) initiated the idea of creating a network of public libraries across Punjab by enacting a legislation.

Then, for the next 75 years, despite the PLA's efforts, due to political and administrative apathy, the idea of the Punjab Public Libraries Bill has done the Sip-and-Winkle act, with a brief wake-up moment in 2011, when the draft of the libraries Bill was prepared and approved by a committee, but the Bill was never passed by the Assembly.

Harinder Pal Singh Kaina, president of the PLA, says that the association has been constantly making efforts in this direction, meeting ministers and raising the issue at relevant platforms. However, their efforts have been stonewalled as no government, irrespective of the party background, is interested in bringing in the Bill.

In the absence of a legal framework, an organised system of libraries comprising Central and state libraries as also libraries at the district



APR/2025: Public libraries in Punjab are in a state of neglect. THANE/INCH

and block/town to village levels cannot be established. Nor can the formation of governing bodies to run and maintain functional operations be maintained, grants and funds procured and modernisation or digitisation be facilitated.

The existing 15 public libraries in Punjab are in a state of neglect. They are understaffed and reflect the apathy of the authorities concerned. The libraries in the states that have a legislative framework get handsome funds and professional assistance from the Raja Ram Mohan Roy Library Foundation (RRRLF), Kolkata, West Bengal.

The absence of a library law reflects the poverty of vision of Punjab's leadership.

The cost of this apathy is huge and the public is paying it by losing the battle to lose instincts, materialism and commercial pursuits and erosion of finer sensibilities. Had robust libraries been set up, the intellectual potential of the public in general and the youth in particular could have been evolved to reap unimaginable tangible and intangible benefits to the state and community.

The lack of political will and administrative apathy to prioritise the Bill for public libraries reflects the poverty of vision of the people at the helm of affairs. Though civil society has time and again been demanding that the Bill be brought back from limbo, the demand has not been consistent or loud enough.

Meanwhile, examples of the success of personal efforts by some individuals like Mr. Gang, a retired engineer from the Irrigation Department who has started a library movement in Punjab by establishing small libraries in places like Lapon in Moga and Maar Mandi in Bafra, present robust evidence that there is a dire need for libraries even in this social-media crazy world and a drug-addiction battered state. People through these libraries and many students give them credit for being the catalyst for their success in academics and competitive examinations.

A 2014 research by Andy Porter of the University of California finds statistically significant reductions in certain crimes when libraries are open for long periods of time. This paper is widely cited as causal evidence that library availability reduces some types of crime.

Another study done by Nelo, Nowicki, and Shukya (2021) compared areas before and after a new library branch was opened. It also compared nearby-versus-farther-away zones. The study found that opening a public library branch is associated with reductions in certain types of crime in areas near the branch — specifically burglary, vandalism, robbery, fraud and assault.

Research findings by Zagier et al. published in the Health Information and Libraries Journal in 2016 have lessons for Punjab.

The research records associations (not randomised causal estimates) between higher library use and lower odds of smoking and drug use, higher quit rates among smokers and lower reported depression/ anxiety in some analyses.

That in a state where the 'Guruk' is revered as the supreme 'Guru', it is ironic that the public has been denied free access to the enriching and powerful benediction of books through public libraries.

सौ वर्षों की स्वर्णिम विरासत



डॉ. अण्ण कुमार

यूपीएससी का शताब्दी वर्ष अतीत का सम्मान करने, परीक्षा का जलजल करने, परीक्षा का जलजल करने और अगले सौ वर्षों की दृष्टि रख करके वह भी एक अवसर है

संघ लोक सेवा आयोग (यूपीएससी) अपने स्थापना के 100वें वर्ष में प्रवेश करते हुए एक महत्वपूर्ण पड़ाव पर खड़ा है। लोक सेवा आयोग (यूपीएससी) की परीक्षाएँ हमारे राष्ट्र निर्माण में संवैधानिक निकायों, सिविल सेवाओं में योग्यता के संरक्षक के रूप में थीं। इसी संघ के साथ यूपीएससी को केंद्रीय सिविल सेवाओं के अधिकारियों की भर्ती, परीक्षा और अनुशासन संबंधी मामलों में अहम भूमिका सौंपी गई। पिछले सौ वर्षों में इसकी विकास यात्रा केवल एक संस्थान का इतिहास नहीं है, बल्कि भारत के उस गहरे विश्वास का प्रतीक है, जो निष्पक्षता, विश्वास और समन्वितता पर आधारित है। संविधान निर्माताओं ने संविधान के भाग-14 में अनुच्छेद 315 से 323 तक के तहत संघ और राज्य लोक सेवा आयोगों को विशेष दर्जा दिया। इसका उद्देश्य उनकी स्वतंत्रता और स्वायत्तता सुनिश्चित करना था, ताकि भर्ती, परीक्षा और

अनुशासन संबंधी मामलों में कोई दबाव या फसल न हो। यह उनके दूरदर्शी विचारों का प्रमाण है कि यह संस्था आज भी योग्यता, भरोसे और ईमानदारी के सिद्धांतों पर मजबूती से खड़ी है। इसके जरिये दुनिया के सबसे विविधतापूर्ण एवं सबसे बड़े लोकतांत्रिक शासन के विगत कार्यभार का संचालन होता है।

यूपीएससी को इस ऐतिहासिक यात्रा में केवल प्रशासनिक निरंतरता ही नहीं मिली, बल्कि यह भारत के लोकतांत्रिक संस्थानों पर बढ़ते भरोसे का भी प्रतीक है। शुरुआती वर्षों में यूपीएससी कुछ ही परीक्षाएं आयोजित करता था, पर आज यह एक बड़ा और विविध कार्यक्षेत्र संभाल रहा है। आज प्रतिष्ठित सिविल सेवा परीक्षा से लेकर इंजीनियरिंग, चिकित्सा, पब्लिक प्रशासन और कई अन्य सेवाओं के लिए भर्ती का चौमंश यूपीएससी के पास है। इसका कारण यह है कि इसका मूल दायित्व पूरी-दोहा की सेवा के लिए सबसे योग्य प्रतिभाओं का चयन करना। सिविल सेवा परीक्षा का लामिस्टिक कार्य भी असाधारण है। प्रारंभिक परीक्षा 2,500 से अधिक स्थानों पर आयोजित होती है। प्रारंभिक परीक्षा के लिए लगभग 10-12 लाख अभ्यर्थी आवेदन करते हैं। मुख्य परीक्षा में चुनौती और जटिलता होती है, जहाँ विभिन्न क्षेत्रों पर प्रत्येक उम्मीदवार को उत्तरी और से चयनित विषय का प्रश्नपत्र उपलब्ध करना होता है। यह चुनौती तब और बढ़ जाती है, जब विद्यार्थी अभ्यर्थियों के लिए विशेष व्यवस्था करने पड़ती है, जैसे सहायक लेखक की सुविधा। दृष्टिबाधित अभ्यर्थियों को बड़े फॉन्ट में प्रश्न पत्र दिए जाते हैं।

यदि यूपीएससी का इतिहास उसकी



अखिल राज

जुलिया है, जो भरोसा, ईमानदारी और निष्पक्षता उसके स्तंभ हैं। दूरकों से लाखों अभ्यर्थियों ने आयोग पर विश्वास जताया है कि सफलता या असफलता सिर्फ उनकी योग्यता पर निर्भर करेगी। यह विश्वास बूझ ही नहीं बना। इसे बढ़ी मेहनत और ईमानदारी से रखा गया है। प्रक्रियाओं में पारदर्शिता, मूल्यंकन में निष्पक्षता और गलत तरीके के खिलाफ सख्त रुख से यह संघ जुड़ा है। प्रश्नपत्र बनाने से लेकर परीक्षा आयोजन और मूल्यंकन तक प्रत्येक चरण में ईमानदारी का परिचय दिया जाता है। ईमानदारी का आशय है संस्था की राजनीतिक या बाहरी दबावों से बचना, गोपनीयता बनाए रखना और यह सुनिश्चित करना कि सार्वजनिक योग्य ही चयनित हों। निष्पक्षता का अर्थ है सभी अभ्यर्थियों को समान अवसर देना-चाहे वे शहर से हों या गांव से, संपन्न हों या गरीब, अंग्रेजी में निपुण हों या न हों। हमारे जैसे विकसित देश में जहाँ कई स्तरों पर असमानता बनी हुई है, वहाँ यूपीएससी परीक्षाओं को समान अवसर का मंच बन जाता है। संस्थान के लिए यह गर्व से भरी उपलब्धि है।

आज जब हम यूपीएससी का शताब्दी समारोह मना रहे हैं, तो हम उन गुणगुण नामों को भी सम्मानित करें, जिनकी कला से यह सफलता संभव हुई। इनमें प्रश्न लेखक करने और मूल्यंकन करने वाले विशेषज्ञ प्रमुख हैं। ये आयोग की अदृश्य रीढ़ हैं। ये देश के बेहतरीन विषय विशेषज्ञ हैं। अपने क्षेत्रों में सार्वभौम होने के बावजूद जिन किसी पहचान या प्रसिद्धि की चाह में वे समर्पण के साथ काम करते हैं। उनका सूक्ष्म कार्य, निष्पक्ष निर्णय और उत्कृष्टता के प्रति अक्षिप्त निष्पक्ष यूपीएससी की शमता का आकार रही है, जो परीक्षा प्रक्रिया को निष्पक्ष, पारदर्शी और मजबूत बनाती है। खी करण है कि आयोग ने देश का भरोसा जीता और समय की हर कसरती पर खरा उतरा। मैं व्यक्तिगत रूप से उनका धन्यवाद करता हूँ, जिनकी निष्पक्ष सेवा सुनिश्चित करती है कि लाखों उम्मीदवारों के सपनों और आकांक्षाओं का मूल्यंकन निष्पक्षता, कड़ाई और पूरी ईमानदारी के साथ हो। शताब्दी वर्षों में प्रवेश कर रहे आयोग के लिए यह क्षण केवल उत्सव का नहीं, बल्कि व्यापक संघर्ष का भी है। शताब्दी

वर्ष हमारे लिए अतीत का सम्मान करने, वर्तमान का जलजल मनाने और अगले सौ साल की दृष्टि रख करने का भी अवसर है। जैसे-जैसे भारत दुनिया में अपनी पुरानी प्रतिष्ठा को फिर से हासिल करने की ओर बढ़ रहा है, वैसावक प्रतिस्पर्धा और तकनीकी प्रगति मौजूदा शासन मंडल में बदलाव ला रही है। ऐसे में एक संस्थान के रूप में यूपीएससी इन बदलावों के अनुसार खुद को ढालेगा, ताकि वह भारतीय लोकतांत्रिक निष्पक्षता और अवसर का प्रकारा स्तंभ बना रहे। इस दिशा में समायोजन प्रकाश भी अंतरा हो गए हैं। नए आवेदन आवेदन पोर्टल से अभ्यर्थियों के लिए आवेदन प्रक्रिया आसान हो गई है। फेस रिक्तिमान तकनीक किसी भी घेरावधारी की रोकने में मददगार बनेगी। हम चयनित उम्मीदवारों की तलाश के साथ-साथ उनकी मदद भी कर रहे हैं, जो हमारी प्रक्रिया में भाग ले रहे हैं। प्रतिभा सेतु जैसी पहल भी उन्हें रोजगार के अवसर प्रदान कर रही है, जो फाइनल परसेन्सिटी टेस्ट तक पहुंचते हैं। पर अंतिम सूची में नहीं आते। क्षमताओं की और बढ़ने की दिशा में एआई के प्रयोग को भी अग्रगण्य जा रहा है।

आयोग के अध्यक्ष और अन्य सदस्यों के साथ यूपीएससी के शताब्दी वर्ष का उत्सव मनाने हुए हम सभी अपनी निष्पक्षता की मजबूती और सदा समान द्वारा इस संस्थान में व्यक्त विश्वास से अभिभूत और प्रेरित हैं। हम दोहाते हैं कि ईमानदारी, निष्पक्षता और उत्कृष्टता के इस स्वर्णिम मायका की बनाए रखेंगे। आगे बढ़ने का हमारा संकल्प अटल है।

(नेता यूपीएससी के अध्यक्ष हैं)

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India's innovation surge: From global tech leader to startup hub



SANDESH SHARDA

Over the years, India has given the world remarkable innovation and leadership - from ground-breaking technologies to Indian origin CEOs in several global tech giants, such as Google and Microsoft. The country is no longer just innovating for domestic consumption; it is also innovating and building solutions for the world.

During the COVID-19 pandemic, the Serum Institute of India emerged as the world's largest vaccine producer, demonstrating rapid scaling to meet global challenges. Another example is indigenization of defence and an impressive rise of 31 times in the last decade in defense exports. Today, Indian refineries are exporting refined oil to the world. Indian startups have grown from just 400 a decade ago, to 1.3 lakhs today and nearly 50% of these are coming up in Tier 2 and Tier 3 cities. While Zomato, Swiggy and Blinkit have captured the market in Tier 1 cities, Tier 2 and Tier 3 cities are coming up with their own startups. Today, Gurgaon has drone manufacturing firms, UP is a leather exports hub and solar firms are rapidly coming up across the country.

The government is investing heavily in Startup eco system, Research and Development (R&D) with a focus on artificial intelligence (AI), machine learning (ML), big data, energy transition, electric vehicles (EVs), quantum computing, genomics, 3D printing, robotics, drones, space and sea exploration. Initiatives like the National Quantum Mission, India AI Mission, and the Semiconductor Mission are steps in the right direction which indicate that the government knows where the future is headed. With the guidance of the government, innovations are rising rapidly. In 2024 alone, Indian startups raised over \$12 billion in 2024, and about 75 percent of this came from international sources. India produces approximately 24,000 PhD graduates annually and many of these are putting out groundbreaking research which is connected to industry needs.

Many firms in Bangalore, Mumbai and Noida are already incorporating AI into their functioning. These firms include consulting firms, those working towards financial firms, and those making defense equipment. The fastest growing economy in the world which exports services worldwide, India is also on its way to become the world's leading startup ecosystem. Vocational training programmes, graduate upskilling programmes, internships for the youth and investment in quantum computing, AI, solar energy and semiconductors are all steps which will take India

forward and propel it towards its goal.

At such a crucial juncture, when India is signing major trade deals with countries across the globe including EU and Japan, significant collaboration between India and the USA has immense potential.

India's rapidly growing innovation ecosystem, fueled by a young, tech-savvy population and an increasingly robust startup culture, combined with the immense scale and market reach of the US, could be a game-changer for the global economy.

The bonhomie between Indian Prime Minister Narendra Modi and U.S. President Donald Trump was one of the defining features of their bilateral relationship during Trump's previous tenure. Their camaraderie was evident in public appearances, from the famous "Howdy Modi" rally in Houston in 2019, where over 50,000 people gathered to witness the two leaders share a stage, to the "Namaste Trump" event in Ahmedabad, India, in 2020. The personal rapport between Modi and Trump translated into a strong diplomatic bond, with both leaders emphasizing shared values and mutual respect.

The bonhomie between the leaders had been instrumental in fostering deeper cooperation between the two nations, especially in defense, trade, and strategic partnerships. Modi's warm approach toward Trump helped elevate India-U.S. ties to new heights, creating a foundation for further collaboration in areas like counterterrorism, regional security, and technology.

Both countries have significantly strengthened their trade and defense relations in recent years, and this partnership holds immense potential for both India and USA. For India, deeper economic ties with the US can lead

to increased access to technology, investments, and markets, while providing American firms with a large, growing consumer base. On the defense front, joint military exercises, shared intelligence, and advanced defense technologies enhance India's strategic capabilities, while the US benefits from having a reliable partner in the Indo-Pacific region.

India's prowess in fields like software development, AI, and renewable energy offers solutions to many of the world's pressing challenges. When paired with the capital, research infrastructure, and global market access of the US, this collaboration can lead to breakthrough technologies that transform industries from healthcare to green energy. Indian innovators, in partnership with global ecosystems which the US is best suited to provide them, will continue to create solutions that will impact and transform the entire world.

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Sandesh Sharda is an investor from Washington DC, often known as the "VC from DC"

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Piggy

R&D Needs a Smoother Ride



Varun Aggarwal & Aditya Sinha

A decade ago, subsidies and payments for services meant long queues, excessive paperwork and widespread leakages. Today, DPI enables these tasks to be completed instantly, securely and at scale. UPI, with its open protocols and interoperable APIs, has reduced transaction costs, expanded financial inclusion and transformed payments into a growth driver.

Simultaneously, the Aadhaar stack has streamlined welfare delivery by authenticating beneficiaries. It's now time to extend the logic of DPI to knowledge creation and innovation.

Innovation today is both catalyst for growth and cornerstone of national power. India faces a twin deficit. Its share of the top 1% of global scientific publications barely exceeds 1%, despite R&D spending surpassing 0.5% of GDP. Absence of interoperable systems linking research inputs — programmes, grants, capital allocations — with outputs — publications, patents, translational outcomes — hinders systematic performance evaluation and course correction.

Foundation for Advancing Science and Technology's (FAST) 'Ease of Doing Research' survey shows that researchers perceive the greatest friction not in designing or executing experiments, but in the expenditure process. A major constraint arises from General Financial Rules (GFR)

2017. Its rigid procurement and utilisation protocols are structurally misaligned with inherently uncertain, time-sensitive and iterative nature of scientific research. While recent amendments have partially eased GFR provisions for procuring specialised equipment, challenges remain: delayed fund disbursement, protracted procurement cycles and fragmented approval pathways that erode efficiency and undermine productivity.

DPI is the right tool to address these twin challenges and is well-suited to enabling frictionless transactions in knowledge creation for three reasons:

❶ **Fragmented and discretionary guidelines** India's innovation ecosystem operates under multiple rules, including GFR, its amendments and ministry-specific regulations. These dictate how funds should be allocated, spent and reported. Guidelines, however, remain interpretive and discretionary. They have not been codified into objective, interoperable, algorithmically enforceable standards, and embeddable into digital systems.

❷ **High-volume, complex transactions** Researchers, institutions and funders navigate multiple steps, in-

cluding raising and disbursing funds, procuring research inputs (infra, equipment, materials), reporting outputs and meeting compliance checks. These processes, spanning grant-making agencies, universities and labs, account for over 0.75% of India's GDP each year. Yet, they remain fragmented and inefficient.

❸ **Lack of RoI measurement** Absence of a common taxonomy across 12 central ministries and agencies means grants are tagged inconsistently, outcomes classified arbitrarily and investments can't be aggregated or benchmarked.

India must build an Innovation stack: a set of standards and protocols for algorithmic transactions in the innovation ecosystem. Its architecture rests on three interoperating layers:

❶ **Standards** Encodes grants, peer review, disbursement, procurement and reporting as machine-readable schemas, enabling calls for proposals to be queried and integrated across agencies.

❷ **Integration** Connects these protocols to existing ERPs, registries and finance systems in universities and labs via APIs.

❸ **Infrastructure** Builds on India Stack — Aadhaar for identity, DigiLocker for credentials, Government eMarketplace (GeM) for procurement, and Account Aggregator for financial flows — enabling interoperability across researchers, institutions and funders.

Currently applying for or managing a grant often means poring over PDFs, manually entering data into separate portals and waiting weeks for approvals. Policymakers, in turn, struggle to answer questions such as how much funding is flowing to drones or AI.

Defining grants as digital objects with standardised metadata on purpose,

eligibility, evaluation, timelines and outcomes will make this process seamless. Agencies can retain their front-ends while operating on shared APIs.

For researchers, this means discovering relevant calls in real time, receiving automated alerts and submitting proposals programmatically instead of wrestling with portals. On the agency side, expenditure tracking becomes rule-based, small purchases could be auto-cleared within hours, while larger equipment requests would move to designated officers with defined timelines. Every step would be auditable. Benefits are substantial:

- Lower transaction costs through shared taxonomies and auto-filled applications.
- Greater transparency via peer-review protocols with traceability and feedback.
- Faster fund flows using Account Aggregator and auto-generated utilisation certificates.
- Streamlined procurement through research-specific GeM catalogues.
- Enhanced collaboration and policy alignment through federated registries of projects, instruments and outputs, enabling researchers to identify partners while allowing the government to link inputs, outputs and outcomes.
- Real-time dashboards tracking approval cycle health, pending requests, average processing time and bottlenecks, helping funders and researchers monitor progress and accountability.

India has already demonstrated how DPIs have transformed economic growth and social welfare. Now, it must show the power of the stack for innovation.

Aggarwal is co-founder, FAST India, and Sinha is a public policy professional



Experiment with truth

A startup revolution, the goal of 'innovation capital'

At the TN Rising Investment Conclave in Hosur recently, a young founder from Torus Robotics walked up to the stage, papers in hand, ready to exchange an investment memorandum of understanding with the Government of Tamil Nadu. What set this apart from most of the other corporate majors exchanging MoUs that day was their journey so far – starting with government-backed incubation and refining a difficult problem with patient mentorship and modest seed support. That morning, they were no longer petitioners for opportunity. They became partners of the government in a significant sector with ₹100-crore investment.

Welcoming startups such as Torus Robotics and many more as investors in the State is a symbol of what we set out to build: a system where a startup nurtured by the government can mature into a collaborator of the State. This is a deliberate outcome of a strategy that marries innovation with inclusion and policy with purpose.

Exponential growth in startups

For decades, Tamil Nadu's industrial identity has been anchored in manufacturing excellence. Over the last four years, we have extended that strength into deep-tech and innovation, quietly, steadily and inclusively.

When our government assumed office, the State had 2,032 Department for Promotion of Industry and Internal Trade (DPIIT)-registered startups. Today, the number has crossed 12,100, which is roughly a six-fold rise in just four years. It is a matter of pride that 50% of them are women-led. Tamil Nadu has been recognised as 'Best Performer' in the States' Startup Ranking 2022 by the Union Government's DPIIT, which is a move up from 'Emerging State' category in 2018. Chennai was ranked 18th in Asia in the Global Startup Ecosystem Report 2024, and among Asia's top 10 for Affordable Talent. Tamil Nadu also leads the nation in the number of incubators and has been named a model State for the innovation ecosystem by the Atal Innovation Mission.

This is an outcome of a three-pillar strategy that the State has followed to facilitate startups and spark innovation. The first pillar is using State capital as a strategic catalyst. Through the Tamil Nadu Startup Seed Grant Fund (TANSEED), seed grants of ₹10 lakh are provided to startups, and ₹15 lakh to women-led, green-tech and rural-livelihood ventures. So far, 169 startups such as Ippopay, Gallabox and Dream Aerospace have received ₹18.79 crore, which have gone on to attract more than ₹537 crore in investments – a 28X multiplier on the State's seed rupee.

We are extending this capital logic to frontier sectors. For instance, the Tamil Nadu Space Tech Fund of ₹10 crore offers milestone-based assistance up to ₹50 lakh on a 1:1 match with external investors, backing both core and



M.K. Stalin

is the Chief Minister of Tamil Nadu

downstream space applications, from satellites to Artificial Intelligence (AI)-driven geospatial solutions.

Focus on inclusion, gender parity

Our second pillar is employing principles of inclusion, and not as charity but strategy. The Scheduled Castes and Scheduled Tribes (SC/ST) Startup Fund, launched in 2022-23 with an initial ₹30 crore and enhanced to ₹50 crore in 2023-24, delivers equity investments to level the playing field. Forty-three startups such as OrbitAid, Unibose and TAMS Tribal Green Fuel have received ₹60.80 crore so far. We followed it up with the Periyar Social Justice Venture Lab – an acceleration programme designed to support social enterprises and empower entrepreneurs from SCs and STs. More than 30 such startups are already engaged, and the model is already yielding appreciable results with eight companies having successfully raised the next round of funding totalling ₹36.9 crore.

We have focused on gender parity through *Thozhil* bootcamps that have equipped over 200 women in Coimbatore, Kanniyakumari, Erode and Chennai – 15 women entrepreneurs received ₹14.70 lakh for incubation expenses. For physically challenged founders and transgender founders, Special Seed Grant Funds of up to ₹5 lakh with structured mentorship and incubation access have been established. For rural innovators, the *Grameen Thoram Puthozhil* scheme (Establishing Start-ups in Villages) has been implemented. The aim is to have 100 startups in 100 villages, using equity-free TANSEED grants of ₹1 lakh and incubation via regional hubs.

Our third pillar was building a decentralised and connected ecosystem. Ten regional hubs – Chennai, Madurai, Tirunelveli, Erode, Salem, Cuddalore, Hosur, Thanjavur, Coimbatore and Tiruchi – bring infrastructure, mentors and markets closer to entrepreneurs. A Metro Hub functions in Chennai, and Thoothukudi has been announced as the next addition. We are also creating the pipeline earlier with 100 Pre-Incubation Centres being rolled out in Tier-II/III/IV institutions. The first 25 have been sanctioned at ₹7.5 lakh each (total cost of ₹1.87 crore).

Digital rails tie these hubs together. MentorTN has onboarded 320 mentors and 1,171 startups and facilitated 1,120 hours of mentoring. TANFUND connects startups to capital with 300-plus investors and 2,500-plus entrepreneurs registered, 221 Investor Connect programmes conducted, 1,417 startup-investor connections and ₹127.09 crore raised so far.

StartupTN is also a key partner in Near *Mudahan's* hackathon programme '*Niral Thiruvizha*', through which we guide student projects toward becoming successful commercial startups. The collaboration connects academic and entrepreneurial ecosystems to help students

develop technology-driven solutions for real-world problems.

We have complemented capital and infrastructure with tools that reduce friction and raise quality. The StartupTN Smart Card gives early-stage startups subsidised access to essential services, helping them save precious cash and scale faster. A bilingual call centre answers queries in Tamil and English, ensuring that first-time founders are not lost for want of information.

Through BrandLabs, our 'Nil-Brand-Sell' course of 250 minutes in Tamil and English helps founders turn great products into credible brands. Our Corporate Innovation Initiative, through an Open Innovation portal, connects startups with large enterprises such as Bosch, Kauvery Hospitals, Hero MotoCorp, PayU, Pierer Innovation and Daimler India Commercial Vehicles among others, to solve real-world challenges.

The results are visible, measurable and nationally acknowledged. What has changed in the last four years? The answer is systems, not slogans. We revitalised StartupTN, expanded it Statewide, and made inclusion the architecture of growth. We ensured that everyone could access the same rails of mentors, markets and money. Those who once left ideas behind now find a hand extended and a path ahead. We moved from ranking at the bottom to leading the table, from episodic initiatives to compounding institutions. We did not inherit a thriving startup engine. We built one.

Global summit in Coimbatore

The Tamil Nadu Global Startup Summit (TNGSS) 2025, taking place in Coimbatore (October 9-10, 2025) is a milestone in our efforts. Over two days, it will bring together over 30,000 visitors, 2,000 delegates, and 750 exhibitors, creating a vibrant space for collaboration and growth. To ensure meaningful connections, we are deploying a first-of-its-kind AI-enabled matchmaking app to help every participant find the right partners, investors, or resources for their specific needs. The summit is also thoughtfully designed with inclusive infrastructure, including dedicated facilities such as feeding rooms and crèches to ensure a welcoming environment for women participants. Investors, founders, students and global leaders from 35 countries will join hands to shape the next chapter of Tamil Nadu's startup story.

From masterclasses by Google, Meta, Microsoft, and Harvard Innovation Labs to insights from leading unicorns and industry pioneers, every session will open new doors. With dedicated pavilions on space-tech, corporate innovation, power brands, and government partnerships, this summit is designed to connect you with opportunities, whether you are an entrepreneur, investor, policymaker, or student.

Tamil Nadu's strategy to facilitate startups and spark innovation is moving to the next chapter – as the Tamil Nadu Global Startup Summit 2025

Saving student lives with institutional interventions

Student suicides often evoke myriad responses. For some, it is a failure, for some, unbearable pressure. For some, an escape and for others, a crime, even institutional murder.

In recent years, public attention has been drawn to a series of high-profile student suicides. For a few days, these tragedies spark debate and outrage. But in an age of vanishing attention spans, the larger crisis continues to unfold every single day.

India loses nearly 14,000 students to suicide each year. Data from the National Crime Records Bureau released this week showed the number of student suicides in India climbed to 13,892 in 2023, climbing 34.4% from 10,335 in 2019 and 64.9% from 8,423 in 2013. A total of 117,849 students died by suicide between 2013 and 2023.

For every suicide death, research suggests there may be 20 attempts. The number of students silently contemplating suicide or enduring severe mental anguish might be manifold.

Suicides are robbing us of young lives brimming with potential — a student's journey ending before it begins. The majority of these deaths occur among those aged 18–30, the very demographic that should be shaping our country's future. Unlike many causes of death among young people, suicide is entirely preventable. And preventing it requires no vaccine or rocket science. What it needs is a socio-political movement grounded in evidence-based interventions and a willingness to listen to young people.

In March, the Supreme Court in *Amit Kumar & Ors vs Union of India & Ors* directed that every suspected suicide must be registered through an FIR. Recognising that student suicides now outnumber even farmer suicides, the court sought to go beyond reactive measures. It constituted the National Task Force for Student Wellbeing and Suicide Prevention under the chairmanship of justice (retd.) S Ravindra Bhat, with subject experts and senior officials from multiple ministries. The mandate: To consult stakeholders, review policies, and present to the court a holistic understanding of the causes of student suicides and the path to prevention.

Attempts to study this epidemic have been made before, but they were fragmented and often limited to specific academic streams. This task force marks the first comprehensive effort to examine suicides across the entire spectrum of higher education. And the

scale is immense: India has over 60,000 higher education institutions, 1.5 million faculty members, and 45 million students. This population is as diverse as India itself — by geography, caste, class, religion, gender, disability, and course of study. To capture this diversity of experience, the task force launched nationwide online surveys (ntf-education.gov.in). Students, faculty, mental health providers and parents are encouraged to respond; concerned citizens can also share their perspectives. Alongside this, higher education institutions are required to provide data on student well-being as part of their institutional accountability.

Some may see this as a grand *samudra manthan* (ocean churn) to extract the *amrit* (nectar) of suicide prevention. But let us be clear: India does not suffer from a lack of policies or documents. The Mental Healthcare Act (2017) and the National Suicide Prevention Policy (2021) already exist. Numerous committees have produced detailed reports. In August, the Supreme Court issued guidelines on preventing student suicides. And yet, young lives continue to be lost. Why? Because our systems continue to respond with apathy — and sometimes, with active oppression. Students are cornered into desperation by discriminatory practices, punitive academic policies, financial barriers, and neglect of mental health services. Their deaths are not just personal tragedies; they are social failures and, too often, institutional ones.

The task force may chart a path forward, but it is ultimately up to us — as educators, policymakers, parents, peers, and citizens — to act. We must build a future where young people can live, learn, and lead without fear. A future where suicide is not seen as a personal failure or a lack of resilience, but as something we, collectively, can and must prevent through systemic and individual change.

Let us resolve to change the narrative. Because every student life lost is one too many. It's a national emergency we can no longer afford to ignore.



Aqsa
Shaikh



Alok
Sarin

Aqsa Shaikh is professor of community medicine, HIMSR, and Alok Sarin is psychiatrist, Sitaram Bharti Hospital. Both are members of the Supreme Court-appointed National Task Force on supporting mental well-being and prevention of student suicides in HEIs.

The views expressed are personal

Why do we need to build rock-solid STEM foundation



**DHRUV
GALGOTIA**

DeepMind CEO and Nobel laureate Demis Hassabis recently emphasised the importance of STEM (Science, Technology, Engineering and Math) skills. He has hit the bulls eye with his appeal. Building rock-solid STEM foundational skills is crucial in this AI era.

The STEM practice in India has witnessed a peculiar paradox. Disappointing admissions to STEM academics across state-level colleges and universities has raised an uncomfortable question - Is a decline a reflection of growing lack of confidence in STEM education?

On one hand, we witness a trend of STEM graduates emerging in large numbers; on the other hand, there are concerns around underemployment and misemployment in core engineering and scientific domains. Recent data from the India Skills Report (2024) notes that only about 50% of Indian graduates are considered employable. A report from Aspiring Minds (now SHL) found that 80% of Indian engineering graduates are unemployable in the knowledge economy owing to several challenges - lack of practical exposure, poor communication skills, and outdated curricula.

It is widely believed that automation has made many traditional STEM roles redundant, while others point to tech layoffs even at elite firms. The recent experience of an IT company's hiring of 450 jobs for coders is a greater reflection that suggests why we need to focus on core skills. 12,000 candidates applied for 450 jobs. Unfortunately, not a single candidate could be hired because most of them relied on an AI tool for a code rather than to apply their mind to solve a business problem.

Many students are tempted to quick fixes which a solid foundation in STEM can resolve. At its core, STEM is about understanding systems. These could be biological, physical, informational, or even mechanical. For example, an understanding of STEM could empower a student to investigate more about the algorithm that powers ChatGPT than to just rely on it for ready-made answers. Naturally, STEM is foundational to real core innovation.

Take a look at Demis Hassabis. He holds a PhD in cognitive neuroscience but it is his scientific understanding that enables him to utilise data into the AlphaFold project. That project solved the complex problem of protein-folding. This was not only a feat for the AI community but that of the whole interdisciplinary science

combining biology, physics, and machine learning.

Even in India, ISRO's Chandrayaan-3 mission was not the product of raw coding talent alone. It required precision engineering, orbital mechanics, materials science, and applied mathematics. These are STEM domains in their classical form.

The real issue with STEM skills is the teachings can seem siloed - disconnected from application. A good solution would be in reimagining STEM education as systems education. One that focuses on strong industry interface, modern lab access, and inter-disciplinary projects.

Aligned with National Education Policy, the idea of Active Learning cuts across technology, human interaction, and even interdisciplinary approaches to redefine classroom learning.

The rise of AI has stoked fear about large-scale job unemployment and redundancy. While such a fear is not misplaced, it overlooks the full picture.

A viable AI model may actually amplify value to those who understand the science and the art behind such systems. For instance, Generative AI could write code, but can we get it to validate complex simulations in aerospace engineering without human supervision? Probably not. Those are aspects that yet need human involvement. Just like Demis Hassabis, scientists such as Dr. Fei-Fei Li at Stanford or many Indian AI researchers across reputed institutions continue to argue that a STEM education is the basic epistemic framework necessary to question AI outputs and for further improvement. STEM education is

crucial in domains like climate modeling, space research, biomedical sciences, and national security where errors have real-world consequences. AI is a multiplier, not a replacement. The demand will shift away from rote coding and toward algorithm design, mathematical modeling, and systems integration. STEM or education as a matter of fact has been perceived as a job conduit. But a good fundamental base is a country's defence against rising pseudo-science, misinformation, and even ideological extremism. If properly delivered, STEM can create a culture of inquiry, falsifiability, and evidence. These are non-negotiables in a society trying to modernise without fracturing itself. In India, initiatives like the Atal Innovation Mission or the National Research Foundation have great propensity to succeed, if the STEM pipeline remains robust.

The Pioneer
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Why is a spectre of empty classrooms looming?

What has the Supreme Court ruled on the Teachers' Eligibility Test? How many teachers are likely to be affected? Why has Tamil Nadu sought a review? What does Article 21A lay down? What is the situation in other States? Are minority institutions part of the verdict?

Krishnadas Rajagopal

The story so far:

The State of Tamil Nadu has sought a review of a Supreme Court judgment requiring in-service teachers from Classes 1-8 in non-minority schools across the country to clear the Teachers' Eligibility Test (TET) in two years or be "compulsorily retired". Other States have equally voiced concern about the September 1 judgment and its harsh lesson to lakhs of teachers validly employed in government, aided, unaided and private schools mentioned under Section 2(n) of the Right of Children to Free and Compulsory Education (RTE) Act, 2009. They are likely to follow Tamil Nadu to the top court.

What is the situation in Tamil Nadu?

Tamil Nadu alone employs 4,49,850 teachers in government and aided schools, of whom 3,90,458 are not TET-qualified. The States have argued that if the judgment is implemented, the entire school system faces the imminent prospect of collapse, with mass disqualification of teachers and denial of classroom instruction to millions of children. Tamil Nadu argues that the judgment provokes a direct conflict with Article 21A (fundamental right to free and compulsory education for children aged six to

Section 23 of the RTE Act does not call for a blanket mandate for Teachers' Eligibility Test'

14) of the Constitution. The State has sought a balance between ensuring quality of education and safeguarding the right to education.

What did the judgment mandate?

The two-judge Bench of Justices Dipankar Datta and Manmohan is not unaware of the ground realities. Justice Datta, who authored the September 1 judgment, acknowledged the contributions of non-TET qualified teachers appointed prior to the RTE Act. The court agreed that dislodging elementary school teachers was a "bit harsh" as they have taught students for decades without any serious complaints. Hence, the court, invoking Article 142 of the Constitution, has exempted teachers with less than five years left to retire from taking the TET. However, they would have to clear the TET if they seek promotion. But teachers who have more than five years of service must mandatorily qualify for the TET within two years from the date of the judgment. If they fail, they would have to quit service or be retired with terminal benefits.

Future appointments or promotions for teachers in non-minority schools would necessarily require TET qualification.

Further, the two-judge Bench judgment referred to a larger Bench the question whether minority educational institutions ought to be also included under the purview of the RTE Act. The court noted that the minority status was being misused by school managements to circumvent the mandate of the RTE Act to have TET-qualified teachers conduct elementary education. The judgment was based on a batch of appeals questioning school education departments' insistence on faculty clearing the TET in minority institutions.

The two-judge Bench criticised a 2014 Constitution Bench judgment in the *Pranati Educational and Cultural Trust* case, which took minority institutions entirely outside the ambit of the RTE Act. The September 1 judgment made a strong pitch to bring schools run by minorities – whether religious or linguistic – into the RTE fold as the 2014 judgment had "unknowingly jeopardised the very foundation of universal elementary education". It said the exemption of

minority institutions from the RTE Act has led to "fragmentation of the common schooling vision and weakening of the idea of inclusivity and universality envisioned by Article 21A"

What do the review petitions argue?

Review petitions filed by Tamil Nadu and a Kerala-based teacher's union, Deseeyas Adhyapaksha Parishad (NTU) Kerala, argues that "even if the objective of enhancing teaching quality is accepted as legitimate, compelling pre-RTE Act appointees to pass TET on pain of disqualification is manifestly disproportionate". Tamil Nadu recommended "less intrusive alternatives" like in-service training, capacity building, refresher courses, or bridging programmes to achieve the same goal without destabilising the education system.

At the centre of the controversy is the interpretation of Section 23 of the RTE Act. As per 23 (1), the National Council for Teacher Education (NCTE) has laid down minimum qualifications for a person to be eligible for appointment as a teacher in Classes one to eight, through its notification on August 23, 2010. An essential qualification is passing the TET conducted by the appropriate government. The rationale for including the TET is to bring national standards and the benchmark of teacher quality in the recruitment process.

In its review petition, Tamil Nadu contended that Section 23(1) would apply only to future recruitment of teachers. The State refers to Section 23(2) which empowers the Centre, through notification, to relax the minimum educational qualifications for appointment of teachers for a limited period not exceeding five years in case States have to deal with contingencies of dearth of teachers or institutional shortages. A proviso appended to Section 23 also makes it clear that any teacher who, at the commencement of the RTE Act, did not possess the minimum qualifications (TET) must acquire such qualifications within a period of five years. Section 23 does not call for a "blanket mandate" for TET nor could the interpretation of the provision be stretched to retrospectively disqualify teachers who were validly appointed before the notification of minimum qualifications (TET). Tamil Nadu submitted in its review plea.

The State said the September 1 judgment raises the spectre of "empty classrooms" and distracted teachers scrambling to save their livelihood for the next two years.



PERASAMI M

What is Nagaland's job quota issue?

Why is the government relooking its jobs policy? Why are the tribes in the State divided on the policy?

Rahul Karmakar

The story so far:

In April 20, an ultimatum of the "advanced" tribes in Nagaland set the Nuphaa Rio-led government a 30-day deadline to review the job reservation policy for the State's Backward Tribes (BTs). The government formed a panel on September 22 to examine the job quota policy, but the five-tribe body found fault with its nomenclature.

What is the job reservation policy?

About four years after it attained statehood in December 1963, Nagaland introduced a policy to reserve 80% of State government jobs for all indigenous Scheduled Tribes. The government identified 11 BTs in 1971 and apportioned for them what came to be known as "reservation within a reservation". In August 2004, Chief Minister Nuphaa Rio told the 60-member Nagaland Assembly that 37% of non-technical and non-preserved jobs are currently reserved for BTs. He said this quota is divided into 25% for seven BTs in eastern Nagaland comprising six districts – Kohima, Longleng, Mohe, Kohima, Shomvoter, and

An reorganisation of five 'advanced' tribes seeks a fresh look at the job quota system, saying a review is long overdue

Thunokang – and 12% for the remaining four BTs. An April 2025 notification from the State's

Administrative Services Department said the Chakhesang and Pochury tribes inhabiting Phek district will be clubbed together for half the 12%, while the Zeliang tribe will have 4% of government jobs reserved for them, and the remaining 2% will be reserved for the Sumi tribe in Kohima district. Beyond Kohima, the laws are joining the five non-BT communities along with the Mijima, Awa, Lachas, and Konyak.

Why do the tribes want this policy revised?

In September 2004, the Five Tribes Commission on Review of Reservation Policy (CoRRP) submitted a memorandum to the State government, expressing an awareness of the job quota system. The members of the commission are representatives of the apex tribal bodies of each of these five tribes. The commission argued that the policy was relevant in 1971, but it no longer reflects the prevailing socio-economic and educational landscape of the State. Its secretary, G.K. Zharawia, told that the CoRRP's core demand was to "either scrap the reservation policy altogether or allocate the remaining unreserved (20%) quota to the five tribes." He also said the government was back on a move to review the policy in 1987 and agreed to delay two years later, stating that the quota itself would continue until further notice. The CoRRP set its first 30-day deadline on April 20 for the government to act on its demand for a review. "We are not against any tribe benefiting from the reservation policy. A review of this 45-year-old policy is long overdue because of the rapidly changing scenario now," they said.

How did the government respond?

Reverting to the CoRRP's demand, student and social organisations of the BTs-led as well as non-BTs of the job quota opposed any potential revision, arguing that the erosion of the current policy would disproportionately harm the State's marginalised communities. Faced with a backlash from these tribes, the government chose to tread carefully. The CoRRP launched its initial phase of agitation after the expiry of its 30-day ultimatum. It was suspended after Deputy Chief Minister Yenchuaga Pathen assured them that a commission to review the policy would be constituted by June 17. However, Mr. Rio remarked that any significant administrative reforms, including those related to reservation or delimitation, should be undertaken only after the national Census exercise scheduled for 2021. On August 6, the State Cabinet approved the constitution of a seven-member Job Reservation Commission to be headed by a retired IAS officer of the Nagaland cadre. The following day, government spokesperson and Minister K.G. Nange cited official data to claim that the five non-BT tribes hold 64% of the government jobs while the BT tribes hold 34%. He indicated that the quota question needed to be revisited.

Why does the indigenous coalition?

The CoRRP criticised the first commission announced in August as it introduced a member each from the Eastern Nagaland People's Organisation, the Central Nagaland Tribes Council, and the Tanyaka Union Nagaland. They insisted that the commission lacked neutrality as these three organisations represented the BTs wholly or partially. The CoRRP also found fault with the second commission the government announced on September 22. They said that the government deviated from an agreement to name the panel 'Job Reservation Commission' instead of 'Reservation Review Commission'; that implying it was not serious about reviewing the existing quota system. The dilemma over the panel's nomenclature is yet to be resolved.

Treat employment as a national priority

India is the most populous and also one of the youngest countries. Estimates by the Confederation of Indian Industry (CII) suggest that over the next 25 years, India will add around 133 million people to its working-age population (15-64 years), which is close to 18% of the total incremental global workforce. However, India has a short window to leverage this demographic dividend, as the worker population is expected to peak around 2043.

Employment generation is critical for equity and inclusion. Quality jobs at scale can lift millions out of poverty, reduce regional and social disparities, and ensure a more even distribution of growth benefits. Generating jobs is also vital for growth and resilience. In a consumption-driven economy such as India's, broadening consumption through good quality jobs accelerates and stabilises growth.

Focus on long-term job creation

Employment must, therefore, be treated as a national priority. This requires consistent growth policies that encourage steady investment and long-term job creation, rather than fragmented or short-term approaches. Despite central and state governments' initiatives, from skill development to social security, India still lacks a unified national framework that comprehensively addresses employment and livelihoods.

Job creation requires interventions on both demand and supply sides of the labour market. Demand is driven by economic and sectoral growth, while supply is influenced by skills, mobility and societal norms. Without bridging these gaps, policy impact will remain limited. A particular concern is the employability of graduates. College curricula need focused reviews to make graduates job ready, supplemented with skilling programmes that are aligned to industry and emerging sectors.

To address these challenges, an integrated National Employment Policy is of urgent need. This should consolidate existing schemes and align diverse initiatives. It must be developed in coordination with States, key Ministries, and



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India still lacks a unified national framework that addresses the issue of employment and livelihoods

industry. Governance could be overseen by an Empowered Group of Secretaries, with implementation led by District Planning Committees that understand local challenges.

The policy must define time-bound goals, identify high-employment-potential sectors and align trade, industrial, education and labour policies to maximise job creation. It should also tackle labour market frictions, regional disparities and barriers faced by women and marginalised groups, while ensuring that skilling incorporates technologies such as Artificial Intelligence and robotics.

Another challenge is the mismatch between the availability of people and jobs. The Centre and States must work together on migration policies and support systems that promote mobility constructively, without letting politics become a barrier. Building "One India" for employment mobility will be critical.

Timely implementation of the four Labour Codes must also be prioritised and clear transition guidelines and advisory support for businesses will be essential.

Sectors to zero in on

Job creation efforts must focus on labour-intensive sectors such as textiles, tourism, agro-processing, real estate, and health care. The Micro, Small and Medium Enterprises sector, which already employs over 25 crore people, requires a comprehensive support strategy covering access to finance, technology, skilling, and markets to generate "growth with jobs". To address urban job distress, an urban employment guarantee programme could be piloted in select cities.

A major opportunity lies in the expanding gig economy, which employs between 80 lakh and 1.8 crore workers and could grow to 9 crore by 2030. With participation spreading into Tier-2 and Tier-3 cities, it holds enormous potential for job creation and formalisation. A national policy for the gig economy can help unlock this potential.

The policy should promote sector growth

while ensuring worker protection through skilling, finance and social security. A centralised registry could enable seamless onboarding, preserve work histories and reduce entry barriers. Fair contracts, safety standards and grievance redress must also be ensured. With the right institutional and regulatory support, the gig economy can become a cornerstone of India's inclusive workforce.

Beyond numbers, improving job quality through better wages, safer conditions, and social security is vital. Affordable housing near industrial hubs can improve mobility and quality of life. Regionally balanced employment can be promoted through targeted interventions in 100 most underdeveloped districts, rural internships for graduates, and remote work and BPOs in towns. Enhancing female labour force participation should be another priority. This requires incentives under the Employment-Linked Incentive (ELI) scheme, formalisation of Anganwadi and Accredited Social Health Activist roles, investment in childcare and eldercare, and campaigns to address societal norms restricting women's work.

Need for employment data

Finally, high-quality, real-time employment data is critical. A dedicated task force could strengthen methodologies, expand coverage to the informal and rural workforce, and reduce the lag between data collection and publication.

With coordinated reforms, targeted investments, and an inclusive national employment strategy, India can fundamentally transform its employment landscape. Doing so is not only essential to unlocking its demographic dividend, but also central to achieving equitable, resilient, and sustained growth.

These employment-focused measures also tie in with the broader reform agenda that CII has laid out in its recent Report on Policies for a Competitive India. Employment generation, as emphasised in this article, is an integral part of that wider vision of building a competitive India and achieving *Viksit Bharat* by 2047.

How is AI transforming teaching and learning practices in Indian classrooms?

ChatGPT, NVIDIA, and other global business giants are investing heavily in AI in India, with the India AI Mission aiming to build an ecosystem for trusted and inclusive AI; teachers and students use AI tools but ethical dilemmas and the digital divide challenge meaningful classroom interaction

Dev Nath Pathak
Avanika Dharmani
Vibha S Bharadwaj

The story so far:

The U.S.-based ChatGPT, developed by OpenAI, announced the opening of its first office in India this year. Union Minister for Electronics & Information Technology Ashwini Vaishnaw remarked that India is uniquely positioned to drive the next wave of AI-led transformation. With OpenAI, the India AI Mission aims to build an ecosystem for trusted and inclusive AI. Besides, another U.S.-based company, NVIDIA, a world leader in artificial intelligence computing, had announced a partnership with India's Reliance company in 2023. The global business giants such as Google and Microsoft have invested heavily in AI manufacturing and marketing in India.

Tech-savvy pedagogy

In contemporary India, teaching and learning are tangled in ethical twists and turns as teachers and students are increasingly inclined to AI. Integration of advanced technology and pedagogy is arguably a new age mantra for the technocratic management of education. A report of the Central Square Foundation that works with the Indian government said that about 70% of school teachers in India are tech-savvy. Teachers use AI solutions to design pedagogy and curricular content. This shall solicit a qualitative evaluation of AI literacy and

the digital divide in India.

The National Sample Survey report this year provided information about the digital divide at the level of quality and skills. Although a large percentage of the population in India uses the Internet, the logic of inclusion requires participation in the digital world. Inclusion is evaluated through meaningful and relevant use of technology rather than merely usage.

How meaningful is the intervention of AI in the educational world? Does ChatGPT enhance the quality of teaching and learning? These are the questions that ought to be asked while classrooms incorporate ever-evolving AI solutions.

Unbridled AI in educational practices

Contrary to the euphoria, the uncritical embrace of AI threatens the philosophical foundations of teaching and learning. Philosophically, pedagogy entails a humanistic dialogue between the teacher and the student that fosters empathy and trust. The ideal pedagogues in the history of education emphasised the evolution of emancipatory understanding in the classroom. Whether it be the feminist pedagogue Bell Hooks in the contemporary world or Rabindranath Tagore in early modern India, they envisaged a pedagogic alchemy that inspired hermeneutic understanding. The ideal teachers ensured that education was not reduced to the accumulation of information. The educational philosophy solicits a natural and organic rather than singular AI smartness of the teacher and the taught.

There are also ethical dilemmas of using AI for pedagogy. According to a survey by the Centre for Teacher Accreditation (CENTA), a high percentage of teachers employ AI tools in the classroom, more for the fulfilment of technical requirements than for dialogic engagement with students. The use of AI by students has become a concern for the Central Board of Secondary Education in India. The CBSE issued an advisory against using ChatGPT in board exams. Unfair use of the technology by both teachers and students has handicapped the pedagogical essence of classroom interaction between teachers and students. Although AI is enabling, the ethical complexity is seldom a consideration for the technocratic management of educational institutes.

The current educational practices with AI are reduced to superficial use of technology. A teacher using audio-visuals through smartphones and computers in the classroom is mistaken for pedagogic smartness. The transformative capacity of teachers, instead, shall be the yardstick for the evaluation of pedagogy. Only then can AI in the classroom bring about a sense of equity along with improved teaching quality.

India AI mission

India AI's mission envisages the opening of the AI Centres for Excellence (CoE) in education. The mission's pillars are India AI Compute Capacity, geared to establish the infrastructure to support AI innovation, and India AI Future Skills is

towards facilitating the talents to utilise the established infrastructure. These pillars can help create accessible cloud-based tools that promote basic digital literacy and equip all teachers with skills to be tech-savvy. However, teachers also require in-service professional training for capacity enhancement to develop an ethical understanding and meaningful integration of AI into pedagogy. Such a training shall enable pedagogues to critically evaluate and employ technology, with a nuanced capacity to transform the educational practices for a just society. The training modules need to prioritise independence and freedom, creativity and imagination, of both teachers and students.

The mission's Application Development Initiative promises impactful AI solutions aimed at large-scale socio-economic transformation. Such promising aspects ought to be enfolded in a context-sensitive manner when it comes to the integration of AI with educational practices. Only then would AI not reproduce the social and digital inequalities through seemingly unquestionable smart pedagogy. Without adequate social, ethical, cultural, and political anchorage, AI may become an anathema defended in rhetoric and abused in practice.

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Talent Crossroads

China's new K visa for foreign science and technology professionals is more than just an administrative change. It signals a bold attempt to reposition the country as a global talent destination at a time when traditional magnets like the United States are recalibrating their immigration policies. The new visa's design - flexible entry terms, absence of employer sponsorship, and eligibility for graduates of reputed STEM institutions - reveals a clear strategic intent: to pull in skilled individuals who might once have gravitated to Silicon Valley, Boston, or London.

Yet, this ambition is colliding head-on with domestic realities. What might appear as a rational talent-acquisition policy to outsiders has triggered a wave of anxiety within China. A sluggish job market and record youth unemployment have created a combustible environment where any perceived preferential treatment for foreigners is bound to meet resistance. Online reactions have been swift and sharp, reflecting both economic insecurity and cultural unease. The fact that the policy gained wider attention after being dubbed "China's H-1B" in Indian discourse added a nationalist edge to the backlash, with many netizens explicitly targeting Indian professionals as emblematic of this perceived threat.

The sudden public spotlight has turned a bureaucratic reform into a test of political messaging. What was conceived as a global signal is now being refracted through the prism of domestic insecurities. This response is telling. For decades, China's engagement with foreign talent has been limited, and immigration remains a sensitive subject. Unlike the United States, where waves of immigration have shaped the labour market over centuries, China is only now tentatively experimenting with policies that open its doors to outsiders. This requires not only regulatory clarity but also domestic consensus - something that is evidently lacking.

Moreover, practical barriers remain formidable. While ethnic Chinese professionals returning from abroad may navigate language and cultural differences more easily, foreign scientists and engineers without Mandarin fluency face real integration challenges. Beyond language, China's tightly controlled political environment presents deeper structural questions. Innovation thrives in ecosystems that prize intellectual freedom, open debate, and a degree of unpredictability. China's trajectory in recent years has moved in the opposite direction, creating uncertainty about whether foreign talent will find space to thrive. For India, this development carries dual implications. On one hand, it highlights the scale of demand for Indian STEM professionals globally, reinforcing the country's growing human capital advantage. On the other, it signals that competitors are emerging in unexpected places. If China succeeds, even partially, in becoming a viable destination for skilled professionals, India will need to think more strategically about retaining its talent and integrating foreign expertise at home.

The K visa represents both opportunity and paradox: a policy designed to project openness introduced in a socio-political environment unaccustomed to foreign competition. Whether China can reconcile its global ambitions with domestic sensitivities will determine if this initiative becomes a genuine talent magnet or remains a political mirage.

22/16

Kept in check

The Nobel laureates' work has redefined the immune system itself

The 2025 Nobel Prize in Physiology or Medicine has recognised discoveries that transformed the scientific understanding of autoimmune regulation. Today, researchers are exploring these conditions' genetic, molecular, and environmental determinants, paving the way for early diagnoses and targeted interventions. An important chunk of this advance is owed to the work of Mary Brunkow, Fred Ramsdell, and Shimon Sakaguchi, who established the role of regulatory T-cells (Tregs) and the transcription factor FOXP3. In the 1990s, immunologists had already defined the deletion of self-reactive T-cells during maturation, yet this process could not account for the persistence of auto-reactive T-cells in healthy individuals. Sakaguchi figured that an additional mechanism must operate in the periphery. In 1995, his team identified a subset of CD4⁺ T-cells that, when they were removed from mice, led to multiple autoimmune disorders, while restoring the cells prevented disease. Next, Brunkow and Ramsdell, then at Celltech Chiroscience, found that male scurfy mice developed severe multi-organ autoimmunity and died within weeks of birth. They were able to narrow the mutation to the X chromosome, identifying an insertion in the DNA that truncated a previously unknown gene. They named it FOXP3, and found that losing it led to immune collapse. Soon, clinical collaborations reported mutations in FOXP3 in boys with a lethal autoimmune disorder. These findings together established that self-tolerance rested on a molecular switch governing the differentiation and maintenance of Tregs.

Today, in autoimmune diseases, experimental treatments aim to expand or stabilise Tregs. Early clinical trials have shown that reinforcing this cell population can mitigate harmful immune activation without broad immunosuppression. In transplantation, engineered Tregs are being infused to improve graft acceptance. In cancer, researchers are exploring selective depletion or reprogramming of tumour-associated Tregs to enhance immunity without triggering autoimmunity. Beyond therapy, the conceptual shift brought on by the laureates' work has redefined the immune system: from an on/off apparatus to a dynamic ecosystem of activation and restraint. That Brunkow and Ramsdell conducted their work within industry also underscores how private sector research can yield significant discoveries. But even now, some immunologists caution against underestimating the field's incremental nature. In a testament to the broader landscape including overlapping layers of control rather than a single molecular pathway, researchers face several obstacles to translating what they know to safe, scalable therapies. Cell-based therapies' high cost has also accentuated inequities in access, creating ethical and policy challenges.

INSIDE THE FIGHT

The work of this year's winners of the Nobel for medicine helps complete the picture of the immune system

THE NOBEL WEEK kicked off with the medicine/physiology prize going jointly to three scientists. Mary Brunkow, Fred Ramsdell and Shimon Sakaguchi have been honoured for their work on deciphering the intricacies of the immune system, in particular, the mechanism that prevents it from attacking the body's own cells while fighting foreign pathogens trying to enter the body. Most of this work had been done in the 1980s and 1990s, and the discoveries are already having an impact on the treatment of auto-immune diseases, cancer and organ transplants.

The immune system protects the body against diseases by neutralising disease-causing pathogens like bacteria and viruses. Key to this process is the ability of the immune system — in particular, a special kind of white blood cells, called T-cells — to distinguish between the cells of the pathogen and the host body. When this does not happen properly, it leads to auto-immune diseases, in which the T-cells start damaging the body's own cells. Why this does not happen in a healthy body is what the Nobel Prize winners were able to figure out. T-cells are trained to be selective in their approach but this training is not perfect. Sakaguchi identified a special group of T-cells, called regulatory T-cells, or Tregs, that suppresses the activity of other T-cells if they had a propensity to attack the body's own tissues. Brunkow and Ramsdell later discovered the gene that enables some T-cells to function as Tregs. Together, they complete the picture of the immune system.

Their discovery has important implications in the treatment of auto-immune diseases. Organ transplants get complicated because the immune system identifies them as foreign, and begins to attack them. Scientists hope that regulation of Tregs activity could smoothen this process. In cancer, sometimes the reverse process happens. The cancerous cells attract too many Tregs, so that the normal T-cells, which should ideally have been killing the cancerous cells, become ineffective.

Education: Rebuilding the three pillars of national progress



SAKSHI
SETHI

2 THE PIONEER ND OPINION

Education is not merely a system of instruction—it is the architecture of a nation's future. Yet this grand edifice stands fragile when its three foundational pillars — qualified teachers, their effective utilisation, and adequate infrastructure — are fractured. Quality education, the true engine of national progress, cannot be achieved through rhetoric or reform alone. It thrives only when human intellect, systemic efficiency, and structural support align seamlessly. The first and most vital pillar is the teacher. A qualified teacher does far more than complete a syllabus — they spark curiosity, nurture critical thought, and mould young minds. But true qualification extends beyond degrees; it includes emotional intelligence, pedagogical skill, and adaptability in an evolving world. The National Education Policy (NEP) 2020 rightly

emphasises continuous professional development, yet many teacher training institutions still function as mere degree factories, offering certificates rather than competence. The 2023 UNESCO Global Education Monitoring Report notes that over 85 per cent of Indian secondary teachers meet qualification norms, but fewer than half can effectively integrate interdisciplinary or digital learning. This gap — qualification without competence — reduces teaching to a mechanical act. The OECD's Education at a Glance 2023 found that nearly one-third of new teachers in the U.S. leave within five years, driven by stress and lack of recognition. The message is clear: no curriculum can succeed without inspired and empowered teachers. Education systems must treat teachers not as executors of policy but as the intellectual architects of national growth. The second pillar — proper utilisation of teachers — is equally critical but often ignored. India's education system reflects a paradox of plenty and poverty: urban centres overflow with educators while rural and tribal schools face acute shortages. The UDISE+ 2022 report revealed that over 1.2 lakh schools still operate with only one teacher. Even where teachers exist, mismatches persist — postgraduates teaching primary classes while less-qualified staff handle senior grades. Such inefficiencies waste talent and dilute outcomes. Global models offer lessons. Finland recruits teachers from the top 10 per cent of graduates, gives them autonomy, and

assigns them roles based on expertise rather than administrative convenience. The result is excellence grounded in trust and respect. India must similarly embrace data-driven deployment, transparent transfers, and decentralised decision-making to ensure teachers serve where they are needed most. The third pillar — robust infrastructure — forms the silent scaffolding of learning. While policy narratives highlight digital classrooms, realities on the ground remain sobering. The ASER 2023 survey shows that 28 per cent of rural schools lack functional toilets, and nearly 40 per cent face classroom shortages. The pandemic further exposed the digital divide. Infrastructure is not a luxury; it is the great equaliser of opportunity. Yet bricks and bandwidth alone cannot transform education. True quality emerges when trained teachers work in supportive environments that empower innovation. Classrooms must evolve into laboratories of curiosity where learning is co-created, not dictated. The triad of qualified teachers, equitable utilisation, and strong infrastructure must move from aspiration to action. To build enlightened citizens for a complex world, nurturing this triad is not a choice — it is an obligation. Only when competence, conscience, and context unite in the classroom will education truly become the force of transformation India needs.

The writer is an educator and a councillor.

10/8

China owes a lot to its engineers

India should consider how much of an 'engineering state' it needs to become



TN NINAN
SENIOR JOURNALIST



ACHIEVEMENT: China has built infrastructure on an unprecedented scale, creak

DAN Wang of Stanford's Hoover History Lab has attracted widespread attention with his book, *Breakneck: China's Quest to Engineer the Future*. He argues that China is an "engineering state" while the US is a "lawyerly society". The characterisation is not new. The Economist quotes Bill Clinton as saying during a visit to China in 1998: "You have too many engineers, and we have too many lawyers...let's trade!"

China's engineering achievements hit you in the face if you visit the country today, as this writer did last month after more than a decade. No matter how much you have read about China, the physical experience of its massive airports and railway stations, boulevards and bridges, high-rises and bullet trains is almost overwhelming — especially as it is combined with visible mastery of urban planning and high-quality construction of public facilities. This is an orderly society that has built infrastructure (and built it superbly) on an unprecedented scale.

And it has been done by engineers. As was true of the Soviet Union in its mid-20th century heyday, so with China today: its political leadership has been dominated by engineers. Li Cheng and Lynn White found that a stupendous 80 per cent of the governors, mayors and party secretaries in provinces, major cities and autonomous regions were technocrats.

It wasn't always so. The early leaders of the Chinese Communist Party were products of the liberation struggle. Engineers came into their own only with the third generation of leaders, chosen by Deng Xiaoping. This cohort was led by Jiang Zemin, an electrical engineer, along with others like Zhu Rongji, Hu Jintao and now Xi Jinping, who has studied both chemical engineering and law.

Wan Gang, a victim of Mao's Cultural Revolution, managed to go to Germany for a PhD and then joined Audi. A Chinese minister visiting the Audi headquar-

ters met him and later invited him to return to China. Wan became an early advocate of electrical vehicles and, as the only non-Communist member of the Chinese government, pushed research in electric vehicles (EVs). That helped China establish its leadership in the business. Also, Xu Guangxian graduated from Columbia University and returned to Peking University before setting up a lab for the research of rare earth materials — which too China now dominates. Xu is considered the father of China's rare earths industry.

It's not just that expats returned. Within China, STEM students account for a much larger share of the graduates emerging from China's increasingly high-quality universities each year, compared to any other country. They find a place in Chinese decision-making echelons, which does not happen in the US or India, although India has the second largest number of STEM graduates. As for the US, the Congressional Research Service reported in 2022 that the number of scientists and engineers in the 117th Congress was the same as of radio talkshow host! Lawyers and business people had the largest presence.

India's experience, too, has been that its scientists and engineers can 'build' if given the responsibility. The early examples are M Visvesvaraya in civil engineering and dam construction, Homi Bhabha in atomic energy, MS Swaminathan in agriculture, Vikram Sarabhai and Satish Dhawan in the space programme, and Verghese Kurien, a mechanical engineer who led the milk revolution. Among the other

Putting capable engineers in charge may well put an end to our usual tolerance of shoddy work and celebration of *jugaad*.

engineers who built factories and organisations were Manmohan Sondhi (steel), V Krishnamurthy (electrical machinery) and DV Kapur (power generation). In their wake came people like 'Metro Man' Sreedharan.

It is engineers who built India's software services industry, starting with FC Kohli, who studied electrical engineering at Queen's in Canada followed by systems engineering at MIT. Larsen & Toubro is a company with technological depth, built by two Danish engineers and later by AM Naik. Mukesh Ambani, who has built the world's most complex oil refinery, is a chemical engineer. Nandan Nilekani, who emerged from Infosys, has engineered several elements of the digital public infrastructure.

There aren't enough such examples. Perhaps that is because India's early leaders were lawyers (Gandhi, Nehru, Patel, Ambedkar). And though Nehru strongly advocated the scientific mindset as he strove to build the 'temples' of modern India, the government's administrative culture was and is generalist in its ethos, with subject expertise considered secondary to administrative ability.

Meanwhile, in an irony noted by many, India has produced among the world's best economists and also the world's worst macro-economic policies. But it was economists who took the lead under PV Narasimha Rao (a lawyer by training) in the 1991 reforms. Some of those economists had switched to economics only after studying physics!

Change is now coming. The share of engineers among new recruits to the Indian Administrative Service has risen sharply from about 30 per cent two decades ago to over 60 per cent now. But without career streaming, they too might become generalists.

Such a transition is yet to show in the political leadership, though Narendra Modi believes in the power of technology. Among his senior colleagues, Rajnath Singh and Amit Shah studied science subjects (physics and biochemistry), but the focus of the RSS (whose members dominate the government) is on cultural transformation. Nirmala Sitharaman is an economist, while Piyush Goyal is a chartered accountant. Nitin Gadkari is not an engineer, but Ashwini Vaishnaw is.

An analysis of 36 Union ministers inducted in 2021 showed a preponderance of lawyers, people with business degrees, doctors and two who had been in the IAS. There were said to be several engineers, but no count was given. In the Congress, the only engineer of note is Jairam Ramesh, who studied at IIT (Bombay) and Carnegie-Mellon. But Arvind Kejriwal, an IIT graduate who became Delhi's chief minister, shows the risks of what could happen when an

engineer becomes a politician.

India's business world, meanwhile, is dominated by those from the traditional trader or money-lending castes that have historically emphasised cash management — like the Birlas' traditional *partha* system of accounting. This is doubtless a great strength in business, and it would be grossly unfair to dismiss them as bean-counters, in American parlance. They are, after all, successful entrepreneurs. But financial goals have to support rather than override the larger purposes of a business. In India, that has not always been the case.

Relatively speaking, businessmen from the Parsi, Brahmin, Lingayat and Punjabi khatri communities have focused more on engineering from the very beginning (Tata and Godrej, TVS and Kirloskar, Kalyani and Mahindra), while the prosperous coastal belt in Andhra Pradesh has produced leaders in construction. In the professional class, the best engineers go abroad or acquire management degrees and then go into consulting, finance, or marketing because these pay better.

What we don't have are world-beating first-generation engineer-entrepreneurs like Lei Jun, who studied computer science before founding Xiaomi, and Wang Chuanfu, who studied metallurgy and founded BYD, the world's largest maker of plug-in EVs. Perhaps the Indian ecosystem does not support such entrepreneurs. The question is, who is best placed to understand the needs of such an ecosystem?

It goes without saying that there is no magic-bullet solution to the multiple inadequacies of the Indian system. Even engineers cannot produce magic solutions, but they are trained to do rational problem-solving and systemic thinking, whereas lawyers focus on tackling the opposition in court. And, let's face it, China has made major mistakes in economic and economic structural. But putting capable engineers in charge may well put an end to our usual tolerance of shoddy work and celebration of *jugaad*.

As India struggles to build a competitive manufacturing sector and quality physical infrastructure, we could consider how much of an "engineering state" it needs to become, and what leadership role engineers should play in politics and the administration, as well as in business and industry.

युवाओं की समस्याओं का समाधान खोजें

21 वीं सदी का एक चौथाई हिस्सा बीत रहा है। आने वाले वर्षों में परिवर्तन की गति का अनुमान लगाना आसान नहीं। यह तेजी बढ़ती आकांक्षाओं और जटिलताओं को लगातार बढ़ाएगी। सीखने के तरीके बदल गए हैं, नया ज्ञान, नए कौशल और नवाचार हर दिशा में नए कार्य क्षेत्र खोल रहे हैं। यदि संभावनाएं नई हैं तो समस्याएं भी नई हैं और उनके समाधान भी नए ही खोजने होंगे। जो देश नवाचार में पीछे रह जाएगा, वह भविष्य में हर दृष्टि से पिछड़ जाएगा। इस बीच शिक्षित युवाओं की संख्या बढ़ी है, जिनमें से कुछ भाग्यशाली लोगों के लिए 'ग्रीन कार्ड' ने नई दुनिया के दरवाजे खोले हैं। उनके बाद वाले 'दो-तीन बीएचके और ईएमआइ की दुनिया' में शिफ्ट हो गए हैं, लेकिन अधिकांश युवा असहज हैं। उनके अंदर भविष्य के प्रति अनेक आशंकाएं और व्यवस्था पर बढ़ता अविश्वास बेचैन किए हुए हैं। ऐसा होना स्वाभाविक भी है, क्योंकि हर स्तर पर प्रतियोगी परीक्षाएं आयोजित करने वाली अधिकांश संस्थाएं अपनी साख खो चुकी हैं। कठिन परिस्थितियों में प्रतियोगी परीक्षाओं की वर्षों तक तैयारी करने वाले शिक्षित युवा नहीं जानते कि कब पर्चा लीक हो जाए, नकल माफिया और साल्चर कब उनकी अपेक्षाओं पर पानी फेर दें। नियुक्तियों में ईमानदारी पर युवाओं को विश्वास नहीं रहा है। मंत्रियों और सेवा आयोगों के अध्यक्षों के घरों से करोड़ों की नकदी बरामद होती है, कुछ दिन चर्चा होती है और फिर अगली वैसी ही घटना होने तक सब शांत हो जाता है।

केंद्र और राज्य सरकारें अब नियुक्तियों में 'आउटसोर्सिंग' प्रणाली चलाकर उच्च शिक्षा प्राप्त युवाओं को जिस प्रकार के मानदेय पर अस्थायी नियुक्ति दे रही हैं, वह किसी को भी हताश और निराश कर सकता है। क्या किसी विश्वविद्यालय या नीति आयोग से जुड़ी संस्थाओं ने 'आउटसोर्सिंग' के बढ़ते दायरे पर कोई सर्वेक्षण किया है? उनके लिए नए कौशल सीखने और रोजगार के अवसर खोजने में सहायता देने की कोई योजना बनाई है? शिक्षा संस्थाएं और कौशल सिखाने वाले संस्थान अपेक्षित तेजी से अपनी कार्यसंस्कृति बदल नहीं पा रहे हैं। हर प्रकार के बदलाव और नीतियों



जगमोहन सिंह राजपूत

भारत में बांग्लादेश, श्रीलंका, नेपाल जैसी स्थिति पैदा करने की बातें करने वाले न युवाओं के हितैषी हैं और न देश के



आवश्यक है युवा वर्ग की अपेक्षाओं को समझना। फाइल में सामंजस्य बनाए रखने के लिए जिस स्तर के संवाद की अपेक्षा इस समय है, वह दूर-दूर तक संभव दिखाई नहीं देती। इस समय सकारात्मक दृष्टिकोण की संभावना को जहाँ-जहाँ ढूँढ़ा जा सकता है, उसमें शिक्षा ही सबसे पहले आती है, क्योंकि शिक्षा ही हर क्षेत्र में वैश्विक स्तर पर नीतियों में हो रहे परिवर्तन की ओर ध्यान आकर्षित करती है। वैसे संसद को भी युवा वर्ग के संबंध में अपने उत्तरदायित्व को गहराई से परखना चाहिए।

वर्ष 1789 से 1799 तक चली फ्रांसीसी क्रांति ने तीन शब्दों 'स्वतंत्रता, समानता और बंधुत्व' को विश्वव्यापी स्वीकार्यता प्रदान की। भारत के संविधान में इसे हर प्रकार से सुदृढ़ करने के प्रविधान किए गए, लेकिन हम व्यावहारिक स्तर पर तो केवल आंशिक रूप से ही सफल हो पाए हैं। नेता जाति समाप्त करने पर भाषण देते हैं, वादे करते हैं, लेकिन अधिकांश चुनाव जाति-वैविध्य के गणित पर ही लड़े जाते हैं। जीते या हारे, उसी की उधेड़बुन में डूबे रहते हैं। निश्चित रूप से वे अपने को, मतदाताओं को और

लोकतंत्र को सबसे अधिक हानि पहुंचाते हैं। यह दुर्भाग्य है कि वैशाली और लिच्छवी के गणतंत्रों का उदाहरण देने वाला भारत अपने व्यवहार में लोकतंत्र को केवल चुनाव-तंत्र तक सीमित कर रहा है। आरक्षण के प्रविधान का लाभ जब तीसरी पीढ़ी तक उठा चुके परिवार आगे भी उसका लाभ उठाना प्रारंभ कर देते हैं, तब समाज का वह वर्ग जो वंचित है, अत्यंत कष्टकर मानसिक स्थिति से गुजरता है। वह किसके पास जाए?

बराबरी लाने का सबसे सशक्त मार्ग शिक्षा ही है, लेकिन प्रारंभ से ही हर विद्यार्थी जान जाता है कि वह दो में से किस वर्ग में है- सरकारी या निजी स्कूल में? देश में गैर-बराबरी की जड़ें जमाने में यह विभेद सबसे बड़ा योगदान दे रहा है। युवाओं और नई पीढ़ी में विश्वास और आशावादिता तभी जन्म लेगी, जब देश का राजनीतिक वातावरण पक्ष और विपक्ष के भेद को इस संदर्भ में भुलाकर साझी समरसता के लिए एकजुट हो जाए। इस समय वातावरण में जो तलछी कुछ जाने-पहचाने तत्वों द्वारा लगातार पैदा की जा रही है, वह उनके लिए ही नहीं, देश के लिए भी हानिकारक है। यह देश के युवाओं के भविष्य को भूलकर राजनीतिक हानि-लाभ को प्राथमिकता देने के अतिरिक्त कुछ नहीं है। श्रीलंका, बांग्लादेश, नेपाल के युवाओं के आंदोलनों का उल्लेख कर देश में वहां जैसी स्थिति पैदा करने का प्रयास करने वाले न तो युवाओं के हितैषी हो सकते हैं, न ही भारत के।

शिक्षा के समक्ष इस समय भारत को जानने और समझने के लिए स्वामी विवेकानंद, श्री अरबिंदो, रविंद्रनाथ टैगोर की 'भारत, भारतीयता, उसकी विविधता और दर्शन' का अध्ययन हर अध्यापक और युवा के लिए आवश्यक है। इसकी पूर्णता के लिए आज के परिप्रेक्ष्य में गांधी को जानना भी युवाओं के लिए ही नहीं, राजनीतिक दलों के लिए भी हितकर होगा। संभवतः यह उनमें से कुछ को राजनीति में चरित्र और निर्मलता की शक्ति से उनका परिचय करा सके। इसी से भारत की सामाजिकता और संस्कृति की सार्वभौमिकता को समझने में मदद मिलेगी।

(लेखक एनसीईआरटी के निदेशक रहे हैं)

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Radical tunnel

The Physics Nobel exemplifies value of inquiry not driven by immediate utility

John Clarke, Michel Devoret and John Martinis's experiments in the 1980s proved that the strange laws of quantum mechanics could govern not just subatomic particles but entire circuits visible to the eye. Their discovery of macroscopic quantum tunnelling and energy quantisation in an electric circuit won them the 2025 Physics Nobel Prize. This marks a significant interval since quantum mechanics last directly featured in a Physics Nobel, noticeable given the field's enduring vitality, and at a time when the world anticipates profound revolutions in computing and communications. Their experiments at the University of California, demonstrated quantum behaviour in a circuit comprising two superconductors separated by an ultrathin insulating barrier, also known as a Josephson junction. In classical physics, a current flowing through this system would be trapped in a zero-voltage state unless it had enough energy to cross the barrier. But at temperatures near absolute zero, they found that the current could escape by 'tunnelling' through the barrier, a uniquely quantum phenomenon. The system also behaved as if it were a single large particle, with discrete energy levels instead of a continuous range. To ensure these effects were not artefacts of noise in the circuits, the team took elaborate pains to isolate them from stray microwave radiation. Their results confirmed that a superconducting phase difference, a collective property of the trillions of pairs of electrons that sustained superconductivity, behaved as a single quantum variable.

Josephson junctions are the foundation of superconducting qubits, which animate many of today's leading quantum computers; superconducting circuits also underpin ultrasensitive magnetometers, quantum voltage standards and single-photon detectors used in astronomy and biomedical imaging. By confirming that quantum laws apply to objects "big enough to hold in your hand", the laureates opened a new domain of applied quantum engineering. Today, the challenge is not to prove that macroscopic quantum behaviour exists but to preserve it long enough to be useful. Quantum states are exquisitely sensitive to their surroundings; research thus focuses on materials with lower loss, better filtering and cryogenic control and hybrid architectures that combine superconducting circuits with mechanical, photonic or spin-based systems. The 2025 prize also exemplifies the value of inquiry driven solely by curiosity about nature's limits. When the laureates set out to test whether quantum mechanics could govern a macroscopic electrical circuit, no one foresaw its consequences. Their pursuit of a fundamental question produced the principles underpinning the pursuit of engineers today, including in India, of new technologies – and prestige for their host countries. w/c

Is the U.S. shooting itself in the foot by pushing out STEM talent?

China, the U.K., Germany and several other countries have begun vying for the STEM talent that may now look beyond the U.S.

DATA POINT

Sambavi Parthasarathy
Vignesh Radhakrishnan

The recently introduced \$100,000 visa fee for new H-1B workers in the U.S. is particularly detrimental to Indians, as a previous Data Point story showed. But is the U.S. shooting itself in the foot by pushing out the STEM (Science, Technology, Engineering and Mathematics) talent that it has long relied on?

Jobs in the U.S. IT sector, which is officially defined as 'computer and mathematical occupations' by the U.S. Bureau of Labor Statistics, have grown by about 40% between 2016 and 2024. This makes the IT sector one of the leading ones in the labour market.

Chart 1 shows the sector-wise percentage change in jobs available in the U.S. between 2016 and 2024 (horizontal axis). The farther a circle is to the right, the higher the job growth. Apart from the IT sector, only two others have recorded faster growth in the U.S. — health care support roles, such as nursing, and jobs in the life sciences, physical sciences, and social sciences.

Chart 1 also plots the sector-wise share of foreign-born workers (vertical axis). The higher a circle, the greater the share of foreign workers in 2024. The IT and health care support sectors appear in the upper right section of the graph. That indicates that they are among the fastest-growing sectors, with a slightly above-average share of foreign-born workers — around 25% of the workforce in 2024. Notably, this share has remained unchanged since 2016, suggesting that the representation of foreign-born workers has stagnated despite strong overall job growth.

Should U.S. President Donald Trump be concerned about the large number of foreign-born workers in the fastest-growing sec-

tors of the U.S. economy — sectors that owe much of their success to foreign talent? The H-1B visa is no longer mainly used by Indian IT firms to send workers to the U.S. Currently, American tech giants such as Apple, Microsoft, and Meta are also among the largest recruiters of H-1B talent. Whether the recent policy changes will disrupt this STEM talent flow and, in turn, slow job growth is the question.

According to the Bureau of Labor Statistics, STEM occupations are projected to grow by more than 8% over the next decade (Chart 2), compared to just 2.7% for non-STEM jobs. Does the U.S. have enough home-grown STEM talent to meet this surge in demand? Data show that it may not.

Interest in STEM courses among U.S. residents has grown at a much slower pace than among non-residents. Between 2011-12 and 2020-21, the number of non-residents earning STEM bachelor's degrees in the U.S. rose by 148%, compared to just 47% among U.S. residents. The gap is higher at the Master's level (Chart 3A).

In 2020-21, only 55% of those who earned STEM Master's degrees in the U.S. were residents, while 45% were non-residents (Chart 3B). The U.S. relies not only on foreign-born talent in its current IT workforce, but also on non-residents who make up a significant part of its future STEM workforce. It is these two groups that are being targeted by Mr. Trump's policies.

How other countries have reacted to the H-1B visa fee hike is also telling. China has touted its 'K visa' as an alternative to the H-1B. The U.K. is considering a reduction in visa fees for STEM workers, while Germany's Ambassador to India posted on X an invite welcoming Indian professionals. Reports show that South Korea and Japan too have similar plans. Will the U.S. be able to cope if global STEM talent start choosing other destinations?

Losing a good hand?

The data for the charts were sourced from the Integrated Postsecondary Education Data System (IPEDS), the U.S. Bureau of Labor Statistics's 'Foreign-born workers: Labor force characteristics' report, and the U.S. Citizenship and Immigration Services.



Chart 1: Sector-wise % change in the jobs available in the U.S. between 2016 and 2024 (horizontal axis). Sector-wise share of foreign-born workers (vertical axis). The bigger the circle, the higher the number of workers in the sector in 2024



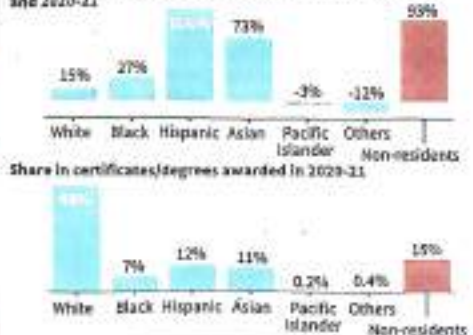
Chart 2: Projected change in employment for STEM and non-STEM occupations in the 2024-2034 period, in the U.S.



Chart 3A and 3B: STEM degrees conferred by U.S. institutions by level of degree. % change in number of degrees conferred between 2011-12 and 2020-21. Resident (blue), Non-resident (red)



Chart 4: STEM degrees/certificates conferred by postsecondary institutions, by race/ethnicity for all degree levels. % change in number of degrees conferred between 2011-12 and 2020-21



SMALL IS BIG

Physics Nobel honours scientists who helped unravel mysteries of quantum world, making it foundation of today's technologies

WHEN THE GREAT American physicist, Richard Feynman, made his famous remark, "nobody understands quantum mechanics", he was only stating the limits of human intuition in understanding the ways of sub-atomic particles. Quantum mechanics forces humans to jettison the quest for familiarity when dealing with the universe at its smallest, most fundamental scale. However, over the years, the insights of quantum systems have informed the working of some of the most transformative technologies. This year's Nobel Prize winners in Physics are among the scientists who have chipped away at the indeterminacy of sub-atomic particles. Over the last four decades, John Clarke, a British physicist based at the University of California, Berkeley, Michel Devoret, a French scientist who has worked at Yale University, and John Martinis, of the University of California, Santa Barbara, have led a "series of experiments to demonstrate that the bizarre properties of the quantum world can be made concrete in a system big enough to be held in the hand".

The studies revolutionised the understanding of quantum tunnelling — the ability of particles, such as electrons, to move or tunnel through barriers. This is somewhat akin to throwing a ball onto a wall and finding it on the other side of the structure, which remains unscathed. Before the trio began their experiments, the ability of single particles to tunnel was known. Clarke, Martinis and Devoret demonstrated that the phenomenon could take place at a far greater scale; they demonstrated the tunnelling effect in a simple electrical circuit incorporating superconductors, which allows current to flow without resistance.

The discovery paved the way for experiments that tested precise quantum physics on a silicon chip, and laid the ground for next-generation digital technology. As the Nobel Committee noted, their experiments "revealed quantum physics in action".

No more 'VIP' postings

Punjab schools get a fair deal, finally

THE Punjab Government's decision to end 'VIP' or choice postings for teachers is a welcome assertion of fairness. The state has long struggled with an inequitable deployment of educators — a problem that goes beyond administrative convenience. Thousands of rural and border schools are reeling under crippling staff shortages, while urban schools often have a surplus. This imbalance has a direct bearing on students' futures. Recent data reveals that about 2,667 primary and upper primary schools in Punjab do not meet the Right to Education norms for teacher strength, and ASER 2024 found only 34 per cent of Class III children in rural areas could read basic text. It is not surprising that where teachers are few or multitasking across classes, exam results have collapsed. In some Class 10 government schools, pass rates have sunk below 20 per cent.

The cause and effect are clear: fewer teachers mean larger classes, weaker supervision and little room for remedial attention. When one teacher handles multiple classes or subjects, attention vanishes and learning suffers. Burnout and absenteeism follow and the gap between urban and rural learning widens. For years, arbitrary transfers, temporary duties and political patronage have skewed postings. The damage is compounded when merit postings and rural incentives are ignored, leaving disadvantaged districts further adrift.

The decision to end arbitrary transfers must be followed by transparent, data-driven rationalisation. Teachers' postings must be linked to student-teacher ratios and local needs. Plus, there is a need for incentives for remote service, regular training and timely recruitment; they are also not luxuries but necessities if the demographic dividend is to be attained. Education equity begins with staffing equity. A child's home address should not decide whether s/he can learn algebra or just wait for a teacher to show up. 5/6

WHEN NUMBERS DON'T COUNT

NIRF risks promoting reputation over merit

The rankings have compromised on core objectives, now reward perceived quality and statistical showmanship

YUSUF AKHTER AND
NAVNEET SHARMA

When the Government of India launched the National Institutional Ranking Framework (NIRF) in 2015, it did so with a noble promise: to build a fair, transparent, and indigenous alternative to global university rankings. For years, Indian institutions had suffered in the QS and Times Higher Education tables, not because they lacked academic strength, but because those rankings privileged international visibility, foreign faculty, and reputation surveys. NIRF was meant to change the narrative. It promised to measure institutions on metrics that reflected Indian realities, rewarding inclusivity, and empowering students, recruiters, and policymakers to make informed choices based on evidence, not elitism.

Nearly a decade later, NIRF has grown into something far more powerful than a ranking list. It now determines who gets research grants, autonomy, student loans, and media mileage. Banks check NIRF scores before funding campuses. Students use it as a shortcut to shortlist colleges. Universities flaunt their ranks on billboards like election slogans. Private colleges, especially, have turned NIRF badges into marketing ammunition. In less than ten years, NIRF has become one of the most influential forces in Indian higher education. But power without accountability is dangerous. What began as a reformist tool is today facing a crisis of credibility. Instead of dismantling academic hierarchies, NIRF is accused of entrenching them. Instead of rewarding genuine quality, it risks incentivising statistical manipulation. Instead of reflecting reality, it may reward those skilled at gaming the system.

NIRF evaluates institutions across five parameters: Teaching, Learning, and Resources (TLR); Research and Professional Practice (RP); Graduation Outcomes (GO); Outreach and Inclusivity (OI); and Perception (PR). On paper, this is comprehensive. In practice, several cracks are now impossible to ignore.

The most problematic metric is Perception. Officially, it carries only 10% weightage. Yet, studies show perception scores correlate up to 85% with overall ranks among the top 100 institutions. That means rankings are echoing reputation rather than recognising real performance. Worse, the process is opaque. Who is surveyed? How many? Are respondents discipline-balanced? No one knows. Unsurprisingly, legacy

central institutions like IITs and AIIMS dominate year after year, while high-performing state universities and private entrants struggle to be seen.

The other serious distortion lies in the Research and Professional Practice metric. Nearly one-fifth of a college's score depends on publication and citation data sourced from global databases such as Scopus and Web of Science. This was supposed to boost India's research culture. Instead, it has triggered a dangerous race for quantity over quality. India now ranks second globally in research retractions. Alarmingly, some institutions with high retraction counts have seen their NIRF research scores improve, proof that misconduct is not meaningfully penalised. A recent rule



to deduct marks for retractions was hailed as bold, but enforcement has been arbitrary. Some offenders escaped untouched, while others were disproportionately punished.

Perhaps the biggest irony is that teaching quality, the core mission of universities, barely counts. The TLR metric relies mostly on inputs like faculty strength, faculty-student ratio, and percentage of PhD-qualified staff. These numbers say nothing about classroom experience. Worse, they are easily faked. Institutions have been reported as inflating faculty rosters just before submission. There is no tracking of pedagogy, student satisfaction, curriculum relevance, or mentorship quality. NIRF is measuring infrastructure, not education.

Graduation outcomes, which should be the most important metric for students and parents, is similarly weak. Placement data is often exaggerated. Internships are rebranded as full-time offers. Salaries are padded with hypothetical bonuses. There is no third-party audit. Consider the irony: IIT Madras routinely tops NIRF rankings, yet IIT Bombay remains the most preferred choice among top JEE rankers, simply because its placement network is stronger. If NIRF rankings do not influence real student choices, what purpose do they serve?

The missing trust

Compounding all this is NIRF's blind

faith in self-reported data. Institutions upload their own numbers with little verification. Major discrepancies have been found between what institutions report to NIRF, what they submit to accreditation agencies, and what appears on their websites. Definitions are ambiguous. Do adjuncts count as faculty? Are visiting professors included? When ranks determine prestige and funding, the temptation to inflate numbers becomes irresistible. What was meant to ensure accountability now risks legitimising manipulation.

Inclusivity, though part of the framework, is treated with tokenism. The Outreach and Inclusivity score assigns minimal weight to diversity indicators such as gender equity, disability access, or implementation of reservation policies. In a country where access to education remains deeply unequal, superficial acknowledgement is not enough.

The biggest problem, however, is methodological stagnation. Higher education in India has transformed in the last ten years with digital classrooms, hybrid models, and rising entrepreneurship. Yet, NIRF's methodology has remained static. Critical details, such as perception respondent counts, penalty formulas, and data conflict resolution, remain hidden from public view. Without transparency, trust evaporates. So what must change?

The research metrics must reward quality, not quantity. Only peer-reviewed publications in credible journals should count. Self-citations, both individual and institutional, must be excluded. Retraction penalties must be applied uniformly and disclosed publicly. The teaching quality must finally be measured meaningfully. Student feedback, curriculum innovation, competitive exam performance, and start-up outcomes should replace superficial faculty counts. And data integrity must be enforced through independent audits. The proposed 'One Nation, One Data' system could be revolutionary, but only if inconsistencies across agencies are eliminated.

The perception surveys must be redesigned scientifically, with transparent sampling and discipline-level separation. Finally, India must rethink its obsession with single-number rankings. Multi-dimensional scorecards or grading bands would allow students, parents, and employers to assign their own priorities instead of blindly trusting a one-size-fits-all hierarchy. Ten years on, NIRF stands at a crossroads. It must choose: evolve into an instrument of truth, or fade into a ceremonial scoreboard. India's academic future may depend on that choice.

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amp/8

In JNU, RSS eyes a legacy reversal

Attempts at the ideological takeover continue to unfold, threatening the university's culture of democratic dissent

JANAKI NAIR

By organising a path shanchalan composed of a couple of hundred men marching with their lathis in the Jawaharlal Nehru University (JNU), the RSS publicly declared its 'victory' stake on Vijayadashami earlier this week. For long, JNU and its well-respected intellectual traditions, its robust student activism, and its carefully nurtured culture of debate and discussion have been targeted by the BJP, its student wing the ABVP, and, of course, the RSS.

A real opportunity to 'conquer' what was/is seen as India's most important (intellectual) Marxist redoubt presented itself with the appointment of Prof Jagadeesh Kumar Mamidala as the university's vice chancellor in February 2016. What was at first a democratic competition for students' hearts and minds soon became a war by the administration against those who were increasingly labelled as 'anti-national' or 'urban naxal' for daring to question and challenge the government.

The rest, as we know, is history. Faculty and students in the university pushed back, with great creativity and verve, against the onslaught on JNU's culture of teaching and learning. Its reputation was severely maligned and damaged, and its faculty and student body were brought under many forms of scrutiny and surveillance. Faculty and students alike were targeted with cases and enquiries that dragged on for years, humiliating and punishing them even though the university administration entertained no hope of winning. The process is the punishment in Naya Bharat.

Neo-nationalism reached a feverish pitch; JNU became the first central university to install a wall of (war) martyrs. Visits and talks by retired and serving military personnel became frequent, and the vice chancellor, in 2017, even requested a tank to be stationed on campus, to 'instil' nationalism and to remind the students of sacrifices made by the soldiers. No tank rolled in, but the shape of the university began to change quite literally with the establishment of courses in engineering and management.

A change of character

The RSS engaged in a form of institutional capture, since it possessed neither the credentials nor the breadth of

vision to establish a 'right' wing version of JNU, though that may have been its original goal. The sight of men solemnly marching to a brass band, while being showered with petals by supporters on the campus, has served as a powerful sign of the legacy reversal that is being pursued as the RSS exerts more power and control over the university's intellectual assets.

Since its inception, JNU has been a residential university with a difference. Partly since its student body enjoyed a larger-than-usual role in determining institutional life, a true alternative to many aspects of life outside the university was imagined and has been sustained over the last half a century.

Two significant achievements speak of the truly alternative values the university has managed to sustain and protect over the decades. The first is the resetting of gender hierarchies, rare and even unimaginable in a society that has been deeply scarred by misogyny, violence against women, and harassment of women in daily and academic life. The JNU campus has enabled female students to feel relatively freer in their daily lives and academic transactions, within and beyond the classroom, in hostels and in public spaces. JNU has paid a price for this freedom, since it has long had to live with the backlash against this achievement, in earning the reputation of being too 'permissive'.

Like many campuses across India, caste/class/regional and ethnic differences are dissolved, as women enjoy forms of respect that are rarely accorded to them outside. Universities such as JNU and the University of Delhi have formulated policies and constituted mechanisms to prevent and redress complaints of sexual harassment.

The unusually high-level participation of the student body in the conduct of student elections through a widely acclaimed constitutional process has kept JNU relatively free of the kinds of violent, money-driven election processes that have become the norm in most universities in the city of Delhi, as well as the country. A rare degree of democratic civility marks student life on the campus, where discussion and debate, even if it is sometimes tediously long, rather than violence in word or deed, govern student interactions.

All this stands to change, even be reversed, as forms of hyper masculinity, so familiar to us in all other aspects of Indian public life, appear to assert themselves, as in the RSS path shanchalan.

(The writer is a retired professor, Jawaharlal Nehru University) **SN/9/8**

Infinite boxes

The Chemistry Nobel laureates established a new grammar of matter

It would not be an overstatement to say that metal-organic frameworks (MOFs) have re-defined what materials can do for society. These porous crystalline structures are built from metal ions coordinated to organic linker molecules and offer gigantic amounts of internal surface area. Their cavities can be tuned to trap greenhouse gases, harvest drinking water from air, and store hydrogen or methane as clean fuels. As industries confront climate change and scarce resources, MOFs exemplify chemistry's power to reimagine sustainability, atom by atom. The roots of this year's Chemistry Nobel Prize, awarded to the developers of MOFs, go back to the 1980s, when Richard Robson, then at the University of Melbourne, wondered whether molecular architectures could be designed rather than found. Inspired by a ball-and-stick model used for teaching, he combined copper ions with an organic molecule whose four ends bore nitrile groups. Contrary to expectations, the ingredients self-assembled into an ordered, diamond-like crystal loaded with empty cavities. Susumu Kitagawa, working in Japan, picked up on the same spirit and made a breakthrough in 1997 when he built a 3D framework of cobalt, nickel or zinc ions linked by bipyridine molecules. When drained of water, the framework remained intact, allowing the gaps between its atoms to hold and release gases as required. In 1998, he also proposed that MOFs could be made of soft solids that 'breathed' as other molecules moved in and out.

Meanwhile in the U.S., Omar Yaghi was dissatisfied with the trial-and-error of conventional reactions and pioneered reticular chemistry, with which he assembled predetermined building blocks into ordered networks. His first frameworks, reported in 1995, were robust two-dimensional nets. By 1999 he unveiled MOF-5, a zinc-based cubic lattice with extraordinary stability and surface area. A few grams contained the internal area of an entire football field. His approach allowed entire families of related MOFs to be designed systematically. Thus, Robson, Kitagawa and Yaghi established a new grammar of matter that allowed others to create thousands of MOFs, some of which moved from prototypes to industrial reactors and semiconductor manufacturing lines. The road ahead is even more promising but also exacting. Researchers are still working to make MOFs more durable in real-world conditions and cheaper to produce at scale. Integrating them into batteries and catalytic filters, for instance, requires engineering as finely tuned as their chemistry. For all these achievements, however, the vision honoured this year transcends any single material. By showing that chemistry can design empty space as precisely as solid matter, the laureates built room not only for molecules but for imagination itself. *W/B*

Next chapter of India-UK partnership in science

The partnership in science and technology is strong and can now pivot to take on new responsibilities for sustainable development of the two countries

The visit of UK Prime Minister (PM) Keir Starmer to India signifies an acceleration of the bilateral relationship, moving beyond traditional cooperation toward a formalised, high-stakes alignment. This trajectory is rooted in the India-UK Vision 2035, a document that sets ambitious goals aimed at delivering "transformative opportunities and tangible benefits" for both nations, which was announced during PM Narendra Modi's June 2025 visit to the UK.

Structured scientific collaboration between the two countries began at the 1st UK-India Science & Innovation Task Force in 2014. These initial agreements formed the basis for targeted funding mechanisms, such as the Newton Bhabha programme, which drives foundational research. Core pillars were later established under the India-UK Technology Security Initiative (TSI) of 2024.

The operationalisation of the TSI, which is jointly monitored by the national security advisers of both countries and undergoes biannual reviews, demonstrates that technol-

ical collaboration is now inextricably linked to national security and economic resilience. This high level of scrutiny and integration ensures that cooperation in key and emerging technologies—from Artificial Intelligence (AI) to critical minerals—is prioritised for immediate, tangible early-harvest results. The cooperation extends to advanced technologies through initiatives such as the Electric Propulsion Capability Partnership (EPCP) and Jet Engine Advanced Core Technologies (JEACT). The India-UK relationship has also established a deep foundation for facilitating long-term joint R&D in areas such as semiconductors, quantum computing, biotechnology, and advanced materials.

The collaboration during the Covid-19 pandemic exemplifies our collaboration. The rapid and massive effort involving Oxford University, AstraZeneca, and the Serum Institute of India (SII) resulted in the swift production and distribution of vaccines, saving lives and critically mitigating the global spread of the virus. Now, the partnership is naturally positioned to move into cutting-edge fields such as cell and gene therapy, and genomic medicine discovery, which aligns directly with India's new strategic thrust into biomanufacturing and biofoundry capabilities through the Biotechnology Research Innovation and Entrepreneurship Development (Bio-

RIDE) scheme. Here, the Indian department of biotechnology's long partnership with the Wellcome Trust has laid the foundations of high-quality biomedical research and is now entering its third phase.

Quantum computing, AI, and biotechnology are globally transformative technologies, and bilateral collaboration must ensure their applications serve the global public good. A prime example of this co-creation model is the research tie-up between Imperial

College London and IIT Bombay. This initiative is pioneering the use of quantum computing and biotechnology to help farmers develop stronger crops that are more resilient to the challenges posed by climate change. Both nations also prioritise AI. Plans are under-

way to establish a joint AI centre under the TSI. Future efforts must focus not only on R&D but also on the ethical and safe governance of AI. While these areas offer great opportunities and rapid growth, their unregulated expansion can pose significant security and societal risks. Here, India and the UK have the opportunity to conduct periodic, rigorous scientific reviews of developments in these areas and to influence regulatory policies and their compliance.

Future collaboration is driven by the convergence of both nations' domestic scientific and technological priorities, ensuring that bilateral fund-



K
VijayRaghavan



Future collaboration is driven by the convergence of the domestic scientific and technological priorities of both nations.

ing directly serves strategic economic objectives. India is aggressively pursuing technological advancement through a mission-mode approach. Initiatives include the launch of the National Quantum Mission, the India AI Mission, the National Green Hydrogen Mission, and the Deep Ocean Mission. The Anusandhan National Research Foundation (ANRF) has been operationalised with a mandate to enhance participation from the private sector and promote interdisciplinary research aligned with national priorities. The UK maintains similarly clear and long-term R&D priorities supported by substantial public expenditure.

The TSI explicitly defines collaboration across seven core technological pillars: AI, quantum computing, biotechnology, critical minerals, telecommunications, advanced materials, and semiconductors. By focusing on these high-stakes sectors, the partnership ensures that R&D directly contributes to mutual economic growth, security, and supply-chain resilience, as outlined in Vision 2035.

The partnership's next phase must prioritise "science for our peoples"

by targeting collaboration in cutting-edge fields that generate societal value and security benefits. Indian founders are increasingly regarding the UK as a strategic "proving ground", valuing the maturity of its frameworks and the confidence it inspires in investment. This perception facilitates a critical shift, enabling Indian companies to move from merely exporting talent to launching sophisticated, compliance-ready global companies.

The UK-India strategic technological partnership must move with speed and urgency. By aligning the scientific genius of India and the UK, the two nations possess the collective capability not only to achieve shared economic goals but also to decisively address existential global challenges, opportunities and threats, delivering cleaner air, healthier populations, and resilient economies worldwide.

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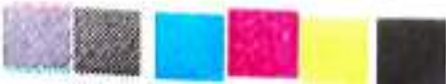
SHAPING THE VOID

Nobel Prize in Chemistry recognises work that re-engineers molecular spaces and offers solutions to environmental crises

OVER FIVE DECADES ago, Richard Robson was building molecular models out of wooden balls and rods at the University of Melbourne. Each hole had to be drilled with precision to reflect the geometry of atomic bonding. But as the models came together, Robson had an epiphany: The placement of the holes — not the connections themselves — determined the overall structure. What if, he wondered, atoms could be coaxed into forming larger architectures, guided by their own geometric preferences? When Robson combined copper ions with multi-armed molecules, they self-organised into a crystalline framework with large cavities. In 1989, Robson suggested such materials could possess novel properties. The work would lay the structural foundation “for the development of metal-organic frameworks” that has won Robson, Susumu Kitagawa, and Omar M Yaghi the 2025 Nobel Prize in Chemistry.

The very idea of engineering empty space — to design the voids in which molecules may wander, interact or be captured — stands as a conceptual turn, especially in an era beset by climate-induced crises. In championing the re-engineering of molecular space as crucial to environmental and technological redress, the award signals a pivot. As tools for carbon sequestration, pollutant removal, and water extraction from air, metal-organic frameworks built from metals and organic (carbon-based) molecules hold out promise for “new opportunities for solving some of the challenges we face”.

Kitagawa, with his history of innovation in hybrid coordination compounds, has pushed the boundary of how porous materials can respond to stimuli; Robson remains a pioneer in coordination polymers; while Yaghi, considered the architect of reticular design, has shepherded theory into experiments and then into applications. Their combined oeuvre underscores an intellectual lineage that comes together in a lattice of curiosity, collaboration and iteration, each insight threading into the next, refracting through time and transforming chemistry into a discipline not only of matter but of possibility.



NEXUS OF GOOD

Redefining Reading Access

From Kolkata's College Street to the cloud, MyPustak.com is reshaping how India reads—making books affordable, accessible, and sustainable for all



ANIL SWARUP

THE WRITER IS
AN AUTHOR AND
A FORMER CIVIL
SERVANT

MyPustak,
founded by Mukul
Agrawal, merges
technology,
sustainability,
and social good
to make books
affordable
and accessible
to millions

Imagine a place where donated books get a second life—refurbished, affordable, and delivered right to your doorstep. That's the inspiring vision behind MyPustak.com, a fast-growing, tech-driven book ecosystem that connects readers, donors, and suppliers, aiming to make reading more accessible, affordable, and sustainable for millions across India.

Founded by Mukul Agrawal, a former Marine Engineer turned entrepreneur, MyPustak has evolved into a vibrant community for book lovers. What started as an ambitious idea rooted in the culture of affordable books has now transformed into a nationwide platform reshaping how India reads, buys, and donates books.

From College Street to a National Platform
The genesis of MyPustak can be traced back to Mukul's college days in Kolkata, where he frequented College Street—Asia's largest second-hand book market, also home to iconic institutions such as Presidency College and the University of Calcutta. Immersed in a culture where affordable books made education and knowledge accessible to all, Mukul dreamt of a scalable solution that could go beyond College Street and benefit readers across the country.

After exploring multiple ideas and experimenting, Mukul hit upon the core idea of building a digital platform that could bridge the gap between book donors, buyers, and publishers. Early efforts included attempts to partner with traditional book-sellers in College Street, but these did not materialise as planned, prompting him to develop his own independent model.

Having served in the Merchant Navy from 2012 to 2017, Mukul finally set sail into the entrepreneurial waters. His extensive research into old book markets in Patna, Hyderabad, and online, along with his experience in logistics, culminated in the incorporation of MyPustak.com as a private limited company in 2021.

"My aim was simple," says Mukul. "To make books afford-



Beyond discounted prices, MyPustak delivers hope—thousands of used books given away absolutely free

able and accessible to every student, reader, and aspirant in India."

How the Model Works

At its core, MyPustak is an innovative circular economy platform that connects book donors, readers, and suppliers using technology-driven solutions. The process begins with the collection of used books directly from donors' doorsteps. Covering over 17,000 pincodes across India, MyPustak's logistics network ensures that donated books are transported securely to its main warehouse in Rajarhat, Kolkata.

Donors can track the journey of their books from the moment they schedule a pickup to their listing on the website or app, providing complete transparency. This aspect of tracking enhances donor trust and adds a sense of purpose to their contribution.

Once the books arrive at the Kolkata warehouse, they undergo thorough quality checks, categorisation, cleaning, and refurbishment where necessary. Each book is assessed for usability, repaired if damaged, and made ready for sale. Leveraging an in-house technology team, MyPustak ensures inven-

tory management, donor-book linkage, and end-customer sales are all managed through a seamless digital process.

"This ecosystem is not just about selling used books; it's about connecting readers, donors, and suppliers in a hassle-free way," explains Mukul. "We wanted to ensure that every stakeholder, whether it's a donor or a reader, has a great experience."

The Growth Story

Since its inception, MyPustak has experienced rapid growth, making significant strides toward becoming India's largest hub for book lovers. Today, the platform boasts:

- ▶ 4.5 lakh registered users
- ▶ 1 lakh active readers
- ▶ Over 5 lakh books delivered to readers in nearly every district across India

MyPustak's mobile application further extends its reach, enabling readers to browse, search, and purchase books at any time and from anywhere with just a few clicks. The platform offers an expansive catalogue covering academic textbooks, competitive exam materials, fiction, non-fiction, and reference books, all at highly

competitive prices.

What sets MyPustak apart is its commitment to affordability without compromising quality. Mukul shares a telling example: "A medical book priced at ₹3,000 in the traditional market is available at ₹400–500 on MyPustak.com. This affordability, coupled with reliable service and seamless delivery, has earned the trust of thousands of readers."

Meeting the Growing Demand for New Books

Initially focused on used books, MyPustak soon identified a significant gap in the market: the demand for new books. Many readers were interested in the latest titles but struggled to find them at reasonable prices through existing channels.

Responding to this insight, the company expanded its business model in 2023, entering the e-commerce space for new book sales. To facilitate this, MyPustak launched a dedicated dropshipping app for suppliers called Stockmate, designed to simplify inventory management and order processing for publishers and distributors.

With an already strong base of over 50 publishing and distribution partners nationwide,

MyPustak has ambitious plans to expand this network to more than 500 publishers and distributors within the next year. This dual-focus approach—on used and new books—positions the platform uniquely in India's book market.

Technology at the Heart of Operations

A key differentiator of MyPustak's model is its deep integration of technology at every stage of operations. From collection scheduling and donor tracking to inventory management, automated quality checks, and customer order fulfilment, the company's proprietary tech solutions ensure efficiency and scalability.

"Technology enables us to operate transparently and at scale," says Mukul. "We designed every system to reduce manual work and enhance the user experience for both donors and customers."

Impact on Sustainability and Society

Beyond business success, MyPustak is driven by a strong social and environmental mission. Encouraging book donations and promoting the reuse of pre-owned books contributes to reducing paper waste, promoting literacy, and making education more accessible to all sections of society.

"We're not just an e-commerce platform," emphasises Mukul. "We're building a community—a movement for book lovers, eco-conscious individuals, and knowledge seekers who want affordable access to learning."

Looking Ahead

From an initial spark of inspiration at College Street in Kolkata to becoming a pan-India platform, MyPustak's journey is a testament to vision, persistence, and innovation. With plans to expand further, onboard more publishers, and deepen its technological capabilities, the startup aims to redefine India's reading culture.

Mukul Agrawal exemplifies the Nexus of Good by presenting a model that is both replicable and scalable for social good.

Views expressed are personal

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Is AI CHANGING HOW COMPANIES HIRE?

FUTURE OF HIRING RESTS ON THE BALANCE BETWEEN HUMANS AND AI WORKING TOGETHER

ANINDITA ACHARYA

Poushali Ghosh was sure she had nailed her final interview. The HR round went smoothly too, and she even got a tentative joining date. But two months have passed, and she's still waiting for that elusive offer letter. It's a familiar story. Recruiters often struggle to sift through hundreds of applications pouring in from different talent pools. Traditional hiring is time-consuming and heavily dependent on human judgement, and yes, biases too often creep in. But now, with AI stepping in, the recruitment game is changing fast. From scanning thousands of resumes in minutes to automating repetitive tasks and even predicting the right job fit with surprising accuracy, AI is making hiring quicker, smarter, and driven by data rather than guesswork.

TRANSFORMATION IN HIRING PROCESS

According to the World Economic Forum, over 90% of employers now use some kind of automated system to screen or rank job applications. A study by Tulane University, citing findings from the Society of Human Resource Management, revealed that one in four HR managers already rely on AI tools at work. And in a recent survey of HR professionals, a whopping 70% said they believe AI will play an even bigger role in shaping the future of HR and people management. "AI is fundamentally transforming the way companies hire people, making the process faster, more efficient, and increasingly focused on skills and human potential rather than just credentials or static documents. By automating repetitive tasks, AI enables employers to hire more than twice as fast, while job seekers benefit from quicker access to opportunities. AI is making hiring less of a guessing game for everyone," said Saumitra Ranjan Chand, Career Expert, Indeed.

ACCORDING TO THE WORLD ECONOMIC FORUM, OVER 90% OF EMPLOYERS NOW USE SOME KIND OF AUTOMATED SYSTEM TO SCREEN OR RANK JOB APPLICATIONS



FAIR OR UNFAIR IS THE QUESTION

Bias in recruitment is hard to ignore. An HR manager might lean toward a familiar face, or a candidate could get a leg up through connections. That's just how the traditional system often works. But many believe that introducing AI into the hiring process can help cut down on such unconscious bias by focusing purely on skills, experience, and data instead of personal influence. "AI software assesses candidates on the standard criteria — skills, experience, and culture fit — unencumbered by gender, age, or background. Fairness, however, is not inherent; it is deliberate. AI must continually be monitored and tuned to prevent biases, but when executed properly, AI makes the hiring process more transparent and fairer. Ultimately, technology can sort resumes quicker — but justice is constructed when people use that technology ethically," said Seema Shukla, Senior HR Manager at Shephertz Technologies.

AI VS HUMANS

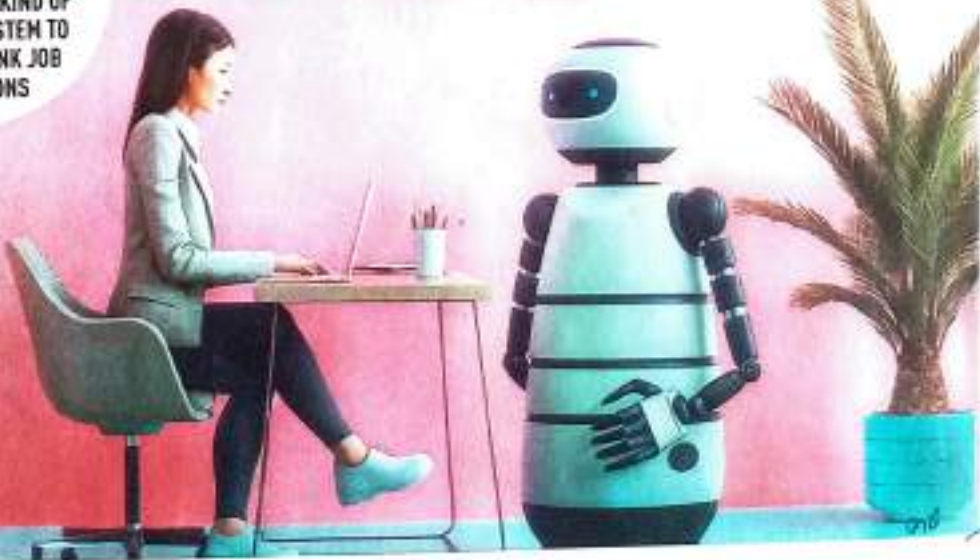
A 2024 Boston Consulting Group (BCG) survey of chief human resources officers revealed that if a company is experimenting with AI or GenAI, 70% are doing so within their HR departments. And within HR, the biggest use case for these technologies is talent acquisition. Traditionally, recruiters stick to a few trusted sources to keep applicant volumes manageable. But with AI, that net can be cast much wider, allowing recruiters to screen many more candidates and identify the best skill-to-role matches faster. In fact, a recent Gallup survey found that 93% of Fortune 500 CHROs have already started integrating AI tools and technologies to strengthen their business and HR practices.

According to Sachin Abug, CEO, NLB Services, there are quite a few areas where AI really outshines humans. "It can automate repetitive tasks, handle large-scale resume screening, and even predict job fit with impressive accuracy. This means faster hiring, fewer human errors, and decisions backed by solid data. In short, AI takes care of the ground-

work so recruiters can focus on what truly matters, connecting with people and making the final call," he said. Shukla added that AI is brilliant at managing scale and repetition. "What this implies is that recruiters can concentrate on doing what only humans can: judging attitude, cultural fit, and potential," she said.

CAN AI REPLACE HRS?

The future of hiring rests on the balance between humans and AI working together. AI isn't here to replace human judgment, it's here to enhance it. By combining data-driven insights with human intuition, recruitment can become more strategic, inclusive, and efficient. Companies that adopt this collaborative approach will not only hire smarter but also build stronger, more diverse, and future-ready teams. "Recruiters aren't being replaced, they're being elevated. AI is transforming the hiring process by handling the high-volume, repetitive tasks that often slow things down, such as initial screening and sorting. But the heart of hiring has always been human. No algorithm can replicate a recruiter's ability to build trust, read between the lines, and guide someone through one of the most important decisions of their life. That's why we see AI as an enabler, not a replacement. By giving recruiters more time and sharper insights, it strengthens their role, allowing them to focus on the conversations, relationships, and cultural fit assessments that ultimately shape successful career journeys," said Chand from Indeed. Abug added that AI is rapidly becoming HRs' smartest assistant, helping them make more informed and efficient decisions.



Internships: Building future-ready youth for a digital India



**T SENTHIL SIVA
SUBRAMANIAN**

In the 21st century, India's guiding mantra "Digital First" — has become much more than a technological aspiration. It represents a transformative vision that integrates education, innovation, and governance to empower the nation's youth. At the heart of this transformation lies a vital tool — the internship. Once seen as a brief work experience, internships today stand as structured platforms for cultivating employability, creativity, and adaptability, preparing students to thrive in a fast-evolving global economy.

Anchored in the National Education Policy (NEP) 2020 [Sections 4.26, 11.8, and 17.8], internships are no longer peripheral add-ons to academic learning; they are an integral part of India's education framework. They blend theoretical instruction with practical exposure, ensuring that graduates enter the workforce not only with knowledge but with the skills, confidence, and mindset to apply it meaningfully. The preparation for effective internships begins from the very first year of undergraduate education. Institutions across the country have established innovation hubs such as the AICTE IDEA Labs, which allow students to explore emerging technologies hands-on. Here, they learn to experiment, design, and make prototypes.

Students also participate in national-level competitions like the Smart India Hackathon, MSME Hackathon, and Startup India Challenge, where they develop practical solutions to real-world problems. These experiences not only refine their technical skills but also foster teamwork, communication, and leadership abilities.

Complementing these are workshops, seminars, and research-based projects that deepen understanding. Through student clubs, professional societies such as IEEE, ISTE, and IETE, and entrepreneurship cells, learners gain multidisciplinary exposure. Field visits to industries, rural communities, and research organisations further expand their perspectives, helping them relate classroom concepts to real-life challenges.

By the time students step into formal internships, they are ready to transform knowledge into competence. Working with start-ups, corporations, research institutions, or NGOs, they learn about organisational culture, project management, and the value of collaboration. They are encouraged to analyse their strengths, reflect through Statements of Purpose (SOPs), and apply design thinking to complex problems.

Beyond technical growth, internships nurture soft skills and ethics — empathy, integrity, teamwork, and professionalism. These are the qualities that employers today value as much as academic merit. The internship experience thus becomes a process of holistic learning — of discovering not only how to work but also how to think, communicate, and lead.

Objectives and Broader Impact

The central goal of internships is to extend learning beyond classroom walls. They promote experiential and hybrid learning, enabling students to engage with industrial, research, and community ecosystems. In doing so, they help learners develop entrepreneurial mindsets and become lifelong learners capable of adapting to future disruptions. Internships also strengthen the nation's STEAM (Science, Technology, Engineering, Arts, and Mathematics) capabilities. Students engage in technical presentations, group discussions, and hands-on experimentation, enhancing analytical and creative thinking.

Many internships also align with the United Nations Sustainable Development Goals (SDGs), motivating students to contribute to sustainable innovations and social responsibility. Through exposure to design thinking, simulation tools, and real-time data, students move from theoretical exercises to developing and testing prototypes. They observe how different departments — R&D, marketing, production, and quality assurance — interact within an organisation. Many conduct market research, gather data using tools like SPSS, JASP, and R, and propose actionable solutions that address real consumer or community needs.

Skilling Through Internships

In a skill-driven economy like India's, internships serve as the cornerstone of employability. National flagship programmes are actively bridging academia and industry. The Pradhan Mantri Internship Scheme connects students with over 500 partner organisations — including Maharatna, Navratna, and Miniratna companies — facilitating project-based learning across key sectors.

The Digital India Internship Programme takes this further, offering placements in frontier technologies such as cybersecurity, cloud computing, blockchain, quantum technology, and digital forensics. These immersive experiences ensure that graduates are equipped with globally relevant competencies.

For women in STEM, initiatives like Vigyan Vidushi — a collaboration between the Tata Institute of Fundamental Research and the Homi Bhabha Centre for Science Education — provide specialised research internships for women pursuing physics and related fields. This is helping bridge gender gaps in advanced sci-

entific research. Covering fields such as digital manufacturing and PLC programming, these short-term modules integrate theory with practice under expert mentorship. Certified by NCVET and aligned with the National Skills Qualifications Framework (NSQF), they often serve as precursors to full-scale internships — enhancing employability and future job readiness.

Internships are now seamlessly integrated into higher education through the Academic Bank of Credits (ABC) system, allowing students to earn academic credits for their practical experiences. This alignment ensures that internships contribute directly to degree completion while offering valuable industry exposure. Many institutions encourage students to extend their internship work into capstone projects or research studies with start-ups, MSMEs, or academic labs. Such initiatives lead to tangible outcomes — research publications, prototypes, and even intellectual property filings. This culture of innovation not only boosts student confidence but also strengthens India's knowledge economy.

Case Studies

Across India, numerous initiatives exemplify the growing depth of the internship ecosystem:

- NIELIT Digital University, under the Ministry of Electronics and IT (MeitY), offers over 100 digital courses in AI, Cybersecurity, Cloud Computing, and Semiconductor Design, partnering with global leaders like Microsoft and Dixon to bridge academia and industry.
- Chip to Startup (C2S), another MeitY initiative, encourages students to design indigenous semiconductor chips, supporting India's vision of technological self-reliance.
- The National Career Service (NCS), in collaboration with Microsoft, provides digital skills and career support under its DigiSaksham initiative, particularly benefiting women and differently-abled job seekers.

Towards a Skilled India

India's internship ecosystem is the bedrock of a future-ready workforce. By merging theoretical learning with real-world problem-solving, internships transform students into innovators, researchers, and entrepreneurs. As the nation advances towards Viksit Bharat@2047, these initiatives are steering India toward global leadership in skill development, research, and digital innovation. The synergy between education, industry, and governance is nurturing a generation of professionals who are not only employable but future capable — ready to build a self-reliant, knowledge-driven India.

The writer is the Head of the Institute Industry Interface Program and Assistant Professor in Electronics and Instrumentation Engineering Department

@SenthilSivaSu2
 The Pioneer

भारत की दृष्टि हैं प्राचीन पांडुलिपियां

पिछले दिनों ज्ञान भारतम् मिशन की रूपरेखा तय करने के उद्देश्य से वैश्विक सम्मेलन का आयोजन किया गया और नई दिल्ली घोषणापत्र अपनाया गया। इसका उद्देश्य भारतीय ज्ञान परंपरा के अभिन्न अंग पांडुलिपियों में बिखरे भारतीय ज्ञान के संरक्षण, उनके डिजिटलीकरण और प्रसार के साथ विदेश चली गई मूल कृतियों को वापस लाने का प्रयास शामिल है। इस घोषणापत्र में मूल पांडुलिपियों को वापस प्राप्त करने और उन्हें विदेश से लाने और उनकी डिजिटल प्रतियां सुरक्षित करने, शोध और राष्ट्रीय गौरव के लिए उन तक पहुंच सुनिश्चित करने का संकल्प लिया गया है। भारत अब तक दुनिया भर से चोरी या फिर तस्करी के द्वारा देश के बाहर गई 600 से अधिक धरोहरों को वापस ला चुका है। इनमें अकेले अमेरिका से ही 559 धरोहरों को वापस लाया गया है। पांडुलिपियां किसी राष्ट्र की जीवन स्मृति और उसकी सभ्यता की पहचान की नींव होती हैं। भारत जैसी संस्कृति वाले राष्ट्र के पास पांडुलिपियों का समृद्ध संग्रह है, जिसमें लगभग एक करोड़ ग्रंथ हैं, जो भारत की समृद्ध सांस्कृतिक विरासत और ज्ञान परंपरा का प्रतिनिधित्व करते हैं।

भारतीय ज्ञान परंपरा से संबंधित पांडुलिपियां ताड़ पत्र, हस्तनिर्मित कागजों, शंटी की छालों, कपड़ों, चर्मपत्र, बर्च (भोजपत्र), ताम्रपत्र के रूप में सुरक्षित हैं, जिनका संरक्षण आधुनिक तकनीक से करने के साथ-साथ शोधकर्ताओं तक पहुंच को आसान बनाना आवश्यक है। ये सभी पांडुलिपियां मूल स्रोत के रूप में हस्तलिखित होती थीं, जो मुद्रण यंत्रों के आविष्कार से पहले सूचनाओं को रिकार्ड करने का साधन थीं। मध्यकाल और आधुनिक काल में विदेशी आक्रांताओं ने इन्हें नष्ट तो किया, लेकिन आजादी के बाद इनके महत्व को न समझना और इनका संरक्षण न किया जाना दुखद है। प्राचीन भारत की समृद्ध सांस्कृतिक परंपरा को भारतीय इतिहास में भी उचित स्थान नहीं मिल पाया। भारतीय इतिहास की प्रवृत्ति केवल राजनीतिक नहीं थी, जो साम्राज्यों के उत्थान और पतन में दिखती है। भारत की समृद्ध ज्ञान परंपरा, लोक चेतना, मानवता और नैतिकता पर आधारित जीवन दृष्टि, प्रकृति के



डॉ. सुशील पांडेय

**हमारी प्राचीन
पांडुलिपियां राष्ट्र
की जीवन स्मृति
और उसकी
सभ्यता के पहचान
की नींव हैं**



समृद्ध प्राचीन भारतीय ज्ञान को मिलती स्वीकार्यता। इससे साथ सामंजस्य और वैज्ञानिक चेतना से युक्त दृष्टि भारतीय जीवन का मूल आधार थी। भारत की दार्शनिक पद्धतियां आध्यात्मिक, धार्मिक और भौतिक चेतना से युक्त थीं, जो अलग-अलग परिस्थितियों में सभी समाजों के लिए मार्गदर्शक के रूप में विद्यमान थीं। जबकि मध्यकालीन मुस्लिम इतिहासकारों ने धार्मिक दृष्टिकोण से राजनीतिक इतिहास लिखा और आक्रांताओं की नीतियों को वैधता प्रदान की।

आधुनिक काल में अंग्रेजी इतिहासकारों ने औपनिवेशिक मानसिकता से भारतीय इतिहास को प्रस्तुत किया, जिसका उद्देश्य भारतीय चिंतनधारा को अवरुद्ध करके पश्चिमी मूल्य और संस्कृति को श्रेष्ठता प्रदान करने के साथ-साथ औपनिवेशिक शासन को वैधता प्रदान करना था। आजादी के अमृतकाल में भारतीय समाज अपने अतीत के प्रति आग्रही दिख रहा है और अपनी मूल चिंतन धारा को नए संदर्भ में प्रस्तुत कर रहा है। नई राष्ट्रीय शिक्षा नीति ने भारतीयता के मूल्यों को स्थापित करने के लिए आधार प्रदान किया है। आज भारतीय इतिहास को शोधकर्ता नई दृष्टि और संदर्भों के साथ-साथ वैज्ञानिक शोधों

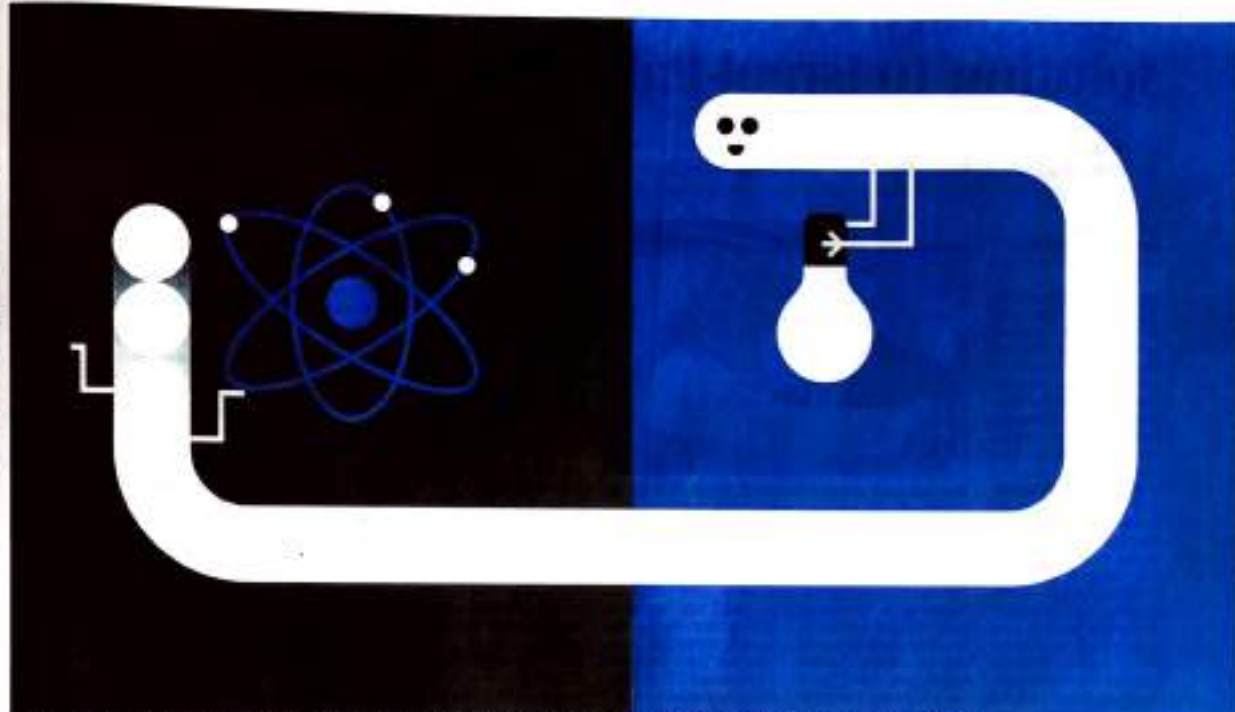
के परिप्रेक्ष्य में प्रस्तुत कर रहे हैं। प्राथमिक और मूल स्रोतों के साथ इतिहास सामने आ रहा है, जिससे अतीत की प्रांति भरे विमर्श अप्रासंगिक हो रहे हैं। पूर्वाग्रह से लिखा गया इतिहास वैज्ञानिक दृष्टि और स्रोतों के साथ आज प्रस्तुत करने से झूठा साबित हो रहा है। पुरातात्विक उत्खनन से भारतीय सभ्यता के नए पक्ष स्पष्ट हुए हैं। भारतीय शासकों की विजय और जनकल्याणकारी शासन के नए पक्ष सामने आ रहे हैं। कई विश्वविद्यालयों में प्राचीन भारतीय ज्ञान पर शोधपत्रों की स्थापना हो रही है और वैज्ञानिक संस्थान भी प्राचीन ज्ञान की महत्ता को स्वीकार कर रहे हैं।

भारतीय जीवन पद्धति, आयुर्वेद और योग को संपूर्ण विश्व धरोहर के रूप में स्वीकार कर रहा है। यूनेस्को भारतीय सांस्कृतिक स्थलों को विश्व विरासत के रूप में स्वीकार कर रहा है। भारतीय ज्ञान परंपरा में हजारों वर्ष का चिंतन-मनन, महान विद्वानों और चिंतकों का शोध, भारत की वैज्ञानिक धरोहर शामिल हैं, जो भारतीय पांडुलिपियों में आसानी से खोजी जा सकती हैं। ये पांडुलिपियां केवल अतीत की धरोहर नहीं हैं, अपितु भविष्य के भारत की दृष्टि और दृढ़ संकल्प हैं। भारतीय ज्ञान परंपरा लंबे समय से चले आ रहे बौद्धिक चिंतन, परस्पर विमर्श और तार्किकता पर आधारित लोक स्वीकृति का परिणाम है। भारत का निर्माण उसके विचारों आदर्शों एवं मूल्यों से हुआ है। भारत की पांडुलिपियां समृद्धी मानवता की विकास यात्रा का पदचिह्न हैं। कोई भी सभ्यता अपने मूल आदर्श और मार्गदर्शक सिद्धांतों के आधार पर आगे बढ़ती है। पांडुलिपियों का संरक्षण और इसके आधार पर इतिहास लेखन राष्ट्र निर्माण की नई परिभाषा प्रस्तुत करेगा। स्व का बोध और अतीत की महान विरासत भारतीयता के मूल्यों को मजबूत करेगी और राष्ट्र के नवनिर्माण का संकल्प पूर्ण करेगी। कल्पनिक स्रोतों पर आधारित पूर्वाग्रह के आधार पर लिखा गया इतिहास भारतबोध को लगातार कमजोर करता रहा है। पांडुलिपियों के आधार पर लिखे गए इतिहास को तार्किक और वैश्विक स्वीकृति प्राप्त होगी।

(लेखक बाबा साहेब भीमराव अंबेडकर केंद्रीय विश्वविद्यालय, लखनऊ में प्राध्यापक हैं)

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KEYWORD



Quantum tunneling is a phenomenon in which a particle passes through an energy barrier instead of having to climb over it. (PHOTO: JAMES H. WILSON, PHOTOGRAPHY BY SCIENCE)

The curious history of how quantum mechanics came to be 'seen' in an electrical circuit

The work that won this year's physics Nobel Prize lay at the end of a chain of ideas that created a bridge from the quantum world of particles to the macroscopic world of devices. Clarke, Devoret, and Martinis showed that macroscopic systems can exhibit quantum tunnelling and energy quantisation

Translated by Mithun

Quantum mechanics is usually described as the science of the very small – of electrons, atoms, and photons that behave in ways that defy the rules of everyday experience. Yet one of the most striking results of modern physics is that this quantum behaviour doesn't vanish abruptly when systems become large. Instead, it continues to show itself in the behaviour of groups of particles doing something together. Over the years, physicists have learnt how to engineer these groups, measure them, and even control them to perform specific tasks.

The 2025 physics Nobel Prize has been awarded to John Clarke, Michel Devoret, and John Martinis for showing in their experiments that quantum tunnelling – a phenomenon in which a particle passes through an energy barrier instead of having to climb over it – can occur not only in the subatomic realm but also in an electrical circuit big enough to see with the naked eye. Their achievement came at the end of one particular chain of ideas stretching back to Brian Josephson, a British physicist who first described how pairs of electrons could tunnel through an insulating barrier between two superconductors, and Anthony Leggett, who later proposed that an entire circuit's collective state could itself behave as a quantum object. Together, these ideas created a bridge from the quantum world of particles to the macroscopic world of devices.

The single quantum wave
In 1962, when Josephson was a 22-year-old graduate student at the University of Cambridge, the Bardeen-Cooper-Schrieffer (BCS) theory had explained superconductivity. In a superconductor, electrons move in pairs known as Cooper pairs, forming a collective state that flows without resistance. Josephson wondered

what would happen if two superconductors were separated by a very thin insulating barrier. Would the paired electrons simply stop at the wall, or would they tunnel through since that's something quantum physics allows?

Using the maths of quantum physics, he showed that it was possible for a supercurrent, i.e., a superconducting current, to pass through even if there was no voltage across the barrier. The result was revolutionary: a current could flow indefinitely across an insulator purely because of the particular relationship between the two superconductors. Josephson derived a simple formula linking the current to the phase difference.

In a superconductor, all the electrons that form Cooper pairs act together as a single quantum wave. And like any wave, this collective quantum state has a phase, which you can think of as a measure of how far along the wave's cycle (crest to trough) it is at a given point.

When you place two superconductors next to each other with a thin insulating barrier between them, each one has its own quantum wave and its own phase. The phase difference is simply the difference between these two phases – i.e., how much one wave leads or lags behind the other.

This difference isn't just mathematical; it's also physically real and it controls how electrons tunnel between the superconductors. In fact, the current that flows across the junction depends directly on the sine of that phase difference, which is what Josephson expressed in his formula ($I = I_c \sin \phi$), where ϕ is the angle expressing the phase difference.

Imagine two synchronised dancers performing the same steps. If they move perfectly in sync (no phase difference), they look like one. If one dancer is slightly ahead of the other, that offset (their phase difference) creates visible interference in their motion. Similarly, when the

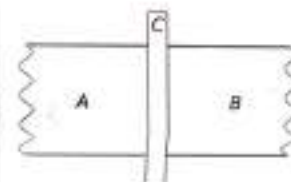
superconductors' phases differ, that offset drives a beat between them, producing a current even when no voltage is applied.

The next great leap

Josephson also predicted that if a voltage were applied, the current would oscillate at a specific frequency proportional to that voltage. He also said that if the setup were illuminated with microwaves of that frequency, there should be a measurable voltage across the barrier. When other researchers quickly confirmed these predictions, this Josephson effect became a cornerstone of quantum electronics. In 1973, the BCS theory won the Nobel Prize for physics, and Josephson followed the next year with the prize for his work.

To visualise the Josephson effect, imagine two reservoirs of water separated by a thin glass wall. Classically, no water should cross it. But in the quantum world, waves associated with the molecules on either side can interfere and create a small but steady leak through the wall. The Josephson junction – which is a sandwich of two superconductors and an insulator – is the electrical version of this improbable leak. The supercurrent doesn't arise from a grab or voltage, but from the coherence of the quantum waves themselves. 'Coherence' here means the ability of the system to maintain its quantum character. And because of this coherence, a Josephson junction can behave like a single quantum entity, even though it contains trillions of electrons.

The next great leap on this chain was that of the British-American physicist Anthony Leggett. By the late 1970s, physicists knew Josephson junctions behaved in ways consistent with quantum theory, but there also remained a deeper conceptual question: could an entire macroscopic variable, such as the current flowing in a circuit, obey the laws of quantum mechanics as if it were a microscopic particle?



A schematic illustration of a single Josephson junction. A and B are two superconductors; C is an insulating barrier. (WIKIMEDIA COMMONS)

Leggett, then a young theorist with a background in superfluid helium, recognised that the Josephson junction offered the ideal testing ground. He proposed treating the phase difference between the two superconductors (remember: a collective property involving trillions of electrons) as a single parameter meaning is an energy landscape. In his model, the system resembled a marble trapped in a valley between two hills. The marble represented the phase difference; the hills represented energy barriers determined by the junction's current and capacitance. If the marble had enough energy, it could roll over the hill, corresponding to the junction switching from a zero-voltage state to one with a finite voltage. But even without enough energy, quantum mechanics allows the marble to tunnel through the hill, appearing on the other side without having to go over the top.

Leggett predicted that at a sufficiently low temperature, when there wasn't enough heat in the system to push it over the energy barrier, a macroscopic variable of the system could tunnel through – and that this could be observed as a small current that's independent of the temperature.

Something remarkable
His work did more than just propose a radical

idea; it set down specific conditions in which microscopic quantum effects could survive the destructive influence of the environment. He analysed how frictional losses and electromagnetic noise (together known as dissipation and decoherence) would discourage quantum tunnelling, and showed how to design circuits that would minimise them. In other words, his theory showed a way to use the Josephson junction to test the limits of quantum mechanics.

Among those who took up the challenge were Clarke, Devoret, and Martinis. They developed exquisitely clean Josephson junctions and cooled them to fractions of a degree above absolute zero. By biasing the junction with a steadily increasing current, they could watch for the point at which it switched into a finite voltage state. At high temperatures, the switch occurred at random currents determined by thermal fluctuations; in the home the simple, the more easily it could jump over the barrier, instead of opting to tunnel through.

But as they lowered the temperature, something remarkable happened. Below a certain point, the temperature no longer mattered: the junction continued to switch with a small but steady probability, exactly as Leggett's model predicted. This escape rate also stopped following the classical thermal pattern and instead settled into a pattern only quantum mechanics could explain. In effect, the trio had caught a macroscopic system tunnelling through an energy barrier.

To strengthen their case, the three then turned to spectroscopy. If the phase variable truly behaved like a quantum particle, it would have to have discrete energy levels. They followed Josephson's prediction and shone microwaves of specific frequencies on the circuit, and found that it absorbed energy only when the frequency matched the gap between energy levels. This was clear evidence of energy quantisation in a macroscopic object.

The superconducting qubit

In two papers in 1980 and 1985, they described the observation of macroscopic quantum tunnelling and quantised energy levels, both in a single Josephson junction – a result that built directly on Josephson's discovery and Leggett's theory. Over the next few decades, as physicists developed materials more suited to these tests and advanced techniques that could make finer measurements, they were able to confirm these effects with ever greater precision. Eventually, the experiments became the foundation of today's quantum computers. As an MIT graduate of Physics Department put it: "The work that opened the field of superconducting circuits, which have become one of the promising platforms for future quantum computing devices."

At the heart of these quantum computers is the superconducting qubit, which is a device that works by harnessing the same quantum behaviour seen in Josephson junctions. A qubit is the basic unit of information in a quantum computer. Unlike a classical bit, which can be either 0 or 1, a qubit can exist in a superposition: part 0 and part 1 at the same time. This allows quantum computers to explore many possibilities simultaneously, making them powerful for solving problems that are too complex for classical computers. Each of these qubits consists of a circuit of the sort the laureates used. By virtue of behaving like a quantum particle, a variable of the macroscopic circuit – e.g. the phase difference – would carry the role of the qubit, while the large size of the circuit would make it easy for an operator to manipulate and measure it.

Leggett has often reflected that while quantum mechanics appears universal, there may still be limits imposed by environmental factors, and that probing those limits is as important as building devices that exploit them. His work on macroscopic quantum systems helped establish the modern field of quantum coherence, which now spans condensed matter physics, quantum optics, and quantum information science. Josephson, meanwhile, went on to explore the philosophical implications of coherence, proposing that the deep connections implied by quantum phase relations may have analogues in other domains.

The challenge of writing about the science Nobel Prizes

Communicating the clever thinking of scientists who win these prizes is a rewarding exercise. But lately, it has also become embarrassing

Vasudevan Mukunth

The Nobel Prizes were announced this week. They have become a fixture of my professional life. Each of the science prizes is awarded for a scientific breakthrough that changed the world. Almost always, these breakthroughs have involved some clever thinking by a scientist or two, and communicating that cleverness and the fact that it is always rooted in curiosity, rather than its practical value, has for me been a great joy. Writing about the prizes has in effect allowed me to express my own cleverness (such as it is) because there's a lot of room and license to be creative.

The science Nobel Prizes also importantly create and hold, for three days in a year, an enormous global appetite for communicating science that would on any other day be considered too obscure. It is thus tempting to dive in and make the most of that chance. The science is sound and the Nobel Foundation's press releases and outreach efforts make for resourceful gateways into understanding the way successful scientists think and work, what materials they need, what challenges they must overcome, and so on.

Of late, however, I've also been discomfited by engaging with the Nobel Prize announcements on such cheerful terms. Some time ago, before I joined *The Hindu*, I spent a few years researching the prizes and engaging critically with their character and interaction with the 'rest of the world'. I wrote many articles raging against the injustices the prizes were embedded in as well as helped to perpetrate. Just the fact that they are awarded only to up to three people at a time (and to none posthumously) paints a distorted picture of how we know science is done: drawing on the work of many people operating in collaboration, including indirectly – but nonetheless crucially – on those people who care for scientists and make sure they can focus on science.

Even when some scientific work is celebrated before winning a prize because

it has already yielded considerable benefits to society, the awards still provide an enormous amount of social validation. This was exemplified by recent prizes for developing the physics of machine learning and laying the foundations of mRNA vaccines, which further elevated the public profiles of Geoffrey Hinton and Katalin Karikó, respectively. Yet the prizes themselves are biased towards research that is already highly visible. They don't recognise and help overcome the systemic barriers that keep good but less visible research from benefiting more people, and they heap more privileges on those who are already very privileged.

Every year when the prizes are announced, it has been a little embarrassing to have to cover them as a journalist. Their current structure doesn't do science any favours but in fact perpetuates biases that many scholars and teachers are today working hard to overcome. In addition to the aforementioned issues, this includes restricting what counts as "world-changing" science to that published in "high impact" western journals, led by scientists affiliated with well-heeled European or North American institutes, and framed within the disciplinary traditions dominant in these regions. Low-cost science meets few of these criteria, yet is just as laudable.

Then again, their own prestige has meant the prize announcements must be covered – and the outreach materials and the public interest they generate provide strong incentives for a science journalist. This creates a dilemma not unlike reporting on a public figure who has said something stupid in public: do you spread the word and raise awareness or do you not give them a platform? Ultimately, I think I must admit that it is possible for something to have two disparate identities at once, to be worthy of celebration as well as censure. If I don't make this adjustment, I will either be a lazy hypocrite or an incurable grump. *WU*

LESSONS IN ENDURANCE

Nobel to László Krasznahorkai is endorsement of literature as resistance, a reminder that great art is not always easy

READING LÁSZLÓ KRASZNAHORKAI can be a daunting exercise. The Hungarian writer's characters drift through landscapes of entropy and ruin — provincial towns, collapsing empires, haunted minds. His prose unfurls across long, labyrinthine sentences that spiral through darkness and grace, that demands that readers look harder, stay longer, feel more. But for those who follow his winding syntax to the end, the reward is a haunting clarity, of the faint, stubborn lights of hope that lie beyond the abyss. It is this architecture of apocalypse and his almost monastic faith in language's capacity to reckon with chaos, "his compelling and visionary oeuvre that, in the midst of apocalyptic terror, reaffirms the power of art", that the Nobel Prize in Literature 2025 honoured.

Born in the provincial town of Gyula, Krasznahorkai's novels reflect Europe's shifting tectonics. In *Sátántangó* (1985), adapted into a seven-hour film by Béla Tarr, a collapsing Hungarian village becomes a stage for cyclical delusion. In *The Melancholy of Resistance* (1989), the arrival of a ghostly circus revives a provincial town's simmering anxieties. In *War and War* (1999), a lonely archivist travels to New York in a manic bid to publish a mysterious manuscript that may or may not hold the key to transcending time. In these narratives that unravel more than they resolve, Krasznahorkai, 71, confronts the most elemental of human fears — annihilation, irrelevance, absurdity — and the unschooled insubordination of hope.

In a world steeped in conflicts and climate crises and a pervasive culture of superficiality, the award to Krasznahorkai comes as a recognition of literature as resistance. It is a reminder that great art is not always immediate, or easy. It demands attention, engagement, even surrender. Sometimes, it lacks the polished graces of the mainstream, the marketable ease of the easily comprehensible. Sometimes, as Krasznahorkai shows, it is a long sentence that leads readers into hearts of darkness, not to be lost, but to witness — and to learn how to endure.

China a global model for inclusive development

Development is a universal goal for nations, but sharing the fruits of development remains a common challenge. With his deep insight into human development trends, President Xi Jinping has proposed a people-centered development philosophy, offering a Chinese approach to fostering global inclusive development.

While development can often be uneven, causing some to fall behind due to various factors, China has steadfastly strived to ensure no one is left behind. Under the leadership of President Xi, 98.99 million rural residents have been lifted out of poverty – a miracle in the history of global poverty reduction, something that former World Bank president Jim Yong Kim called one of the greatest stories in human history. Building on this achievement, the Communist Party of China and the government continue to link these outcomes with rural vitalization, consistently consolidating them.

China ensures that no region is left behind. Development can often exhibit significant asymmetries, with regional disparities becoming pronounced and Matthew effects – a theory which says that people who have more get more,

while those who have less get less – growing evident. As it happened with the “rust belts” in the United States, some initially advanced regions may gradually lose their comparative advantages. By continuously refining regional coordination strategies, increasing transfer payments from the central government, and strengthening paired assistance between better-off and less-advanced areas, China is actively narrowing the regional gaps. Resource-depleted cities, old industrial bases, old revolutionary bases, regions with multiple ethnic groups, border areas, and formerly impoverished areas have overcome challenges, leveraged their strengths, and achieved better development. China provides ordinary people with opportunities to excel in life. Its achievements are in essence built on the personal achievements of ordinary individuals. Access to quality educational resources, diverse employment opportunities, and entrepreneurial prospects form crucial foundations for personal success. The country has invested significantly in promoting education and employment while actively encouraging innovation

and entrepreneurship.

For 13 consecutive years, national public education expenditure in China has remained above 4 percent of GDP, with the gross enrollment rate in higher education exceeding 60 percent in 2024. China's primary and secondary education systems rank among the world's best. Tuition fee at many top public universities in China is only one-twentieth to one-tenth that in many overseas universities. This accessible, high-quality education system has created conditions for social mobility, while a well-educated workforce continues to provide vital support for China's economic development.

Development dividends are shared by all people. China has established the world's largest social security system, with 328 million people now receiving monthly pension, effectively preventing the old-age poverty seen in some countries. It has also built the world's largest medical and healthcare system, improving the availability and regional distribution of quality medical resources. Over 90 percent of households can reach the nearest medical facility within 15 minutes.

Through measures such as centralized drug procurement, China has significantly reduced the prices of medicines and consumables, ensuring that the public has access to equitable and affordable basic healthcare services. With the deeper implementation of the Healthy China initiative, the population's health has markedly improved. Average life expectancy has risen from 74.8 years in 2012 to 79 years in 2024, 5.7 years above the global average. The country is committed to greener and more sustainable development. Guided by the belief that “lucid waters and lush mountains” are invaluable assets, China has vowed to keep air, water and soil clean. It has adopted a holistic approach to reducing carbon emissions, mitigating pollution, and expanding green areas.

As a result, the country has effectively curbed ecological deterioration, and has carried off the palm in improving air quality, enhancing surface water quality and increasing afforestation. It is actively developing green productivity and has established the world's largest renewable energy system, with its installed capacity of hydropower, wind power, and solar power ranking the highest globally. One out of every three kilowatt-hours of electricity consumed in China now comes from green energy.

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US funding cuts will impair research

MR DUA

Massive financial aid cuts threatened by the Trump Administration to many Ivy League American universities and renowned research institutions will paralyze significant path-breaking scientific research projects and its unique global scientific leadership.

One of the latest reports states that U.S. universities will be confronted with acute financial strains emanating from President Trump's proposal to severely diminish funding for research budgets during the rest of his nearly 40-month second presidential term.

To begin with, the Trump White House has already chopped off Harvard University's research funding of \$470 million. And the university's \$2.2 billion grant is also on the line. In addition, cutting costs from 'hiring freezes, research pauses, broad budget cuts, and layoffs are hitting many top-ranking universities.' Though nearly five dozen U.S. universities are on the line, those affected the most include Harvard, Columbia, Princeton and Michigan state.

It is widely believed that all-round budget cuts will severely imperil universities' traditional funding on several fronts in Trump's campaign to remake higher education. But one

thing is for certain - the US's quality, history-making and distinct research standards will largely degrade. According to a recent media report (Wall Street Journal) President Trump has 'yanked or threatened to pull billions of federal research dollars, citing concern about antisemitism and DEI - diversity, equity and inclusion. He has signed an executive order cracking down on foreign funding.' While Columbia University, an Ivy League institution, has already surrendered to the White House diktat for effecting material changes in its various administrative, academic and research programmes, Harvard has stood firm so far. Harvard president Alan Garber has announced he'll take a 25 per cent pay cut. Meanwhile, the university's numerous committees in the faculties of arts and sciences are looking for avenues to save and keep research projects going somehow. All universities are in regular consultation to tackle the situation.

Harvard, globally-recognized for excellence in every area of academic performance boasts 162 Nobel Prize winners and scientists. Many of its researchers are working on cancer immunotherapy, brain tumors, organ transplants, diabetes and more. It was a Harvard researcher who discovered the molecule that is the basis for the GLP-1 weight-loss

medications that have revolutionized obesity care, as reported by The New York Times.

Similarly, just one Columbia department, biomedical engineering, has produced more than 140 inventions in the past five years that led to over 30 industry licenses. In fact, altogether, 87 Columbia researchers and faculty members and alumni have won Nobel prizes. There are numerous other pathbreaking research programmes that await funding. These include pediatric cancer and treatment for veterans. The federal government has already issued a 'stop-work order' on Harvard research. The NY Times report adds 'the upshot is that Trump's lust for power and vengeance may one day be measured by more Americans dying of cancer, heart and other ailments.'

There is yet another report on how financial cuts will 'put research on tuberculosis and A.L.S. - Lou Gehrig's disease at risk' and scientists warn of long-term fallout, but support their research's stance. If stopped 'it'll be the deepest cut yet in a White House campaign against universities that began shortly after Trump took office... other universities include Princeton, Cornell, and Columbia also met with deep cuts to research funding.'

The federal government has also reportedly demanded that Harvard



make 'sweeping changes to its admission and hiring policies... or face financial threats and penalties, including freezing \$2.2 billion in multiyear grants to the university, along with a \$60 million contract.' The university has also been threatened with losing its 'tax-exempt' status.

Meanwhile, though persistent vicious attacks on elite universities by the Trump White House continue unabated, several teachers' associations and university workers' groups have been planning to sue the administration. Many senior faculty members have also taken to writing in the media protesting against the irrational, irrelevant orders for professors and administrators.

One Columbia history professor wrote 'Columbia will not allow any government to deny professors their rightful role in personnel decisions or to dictate the content of our curricula.' Professor Matthew Connolly's reflection further demonstrates the depth of the falling standards of American universities' and makes painful reading. He adds 'We will not collaborate with government agents' intention deporting our students and faculty members simply because they exercised their First Amendment rights... The greatness of American universities is at risk because anti-intellectuals are undermining the foundations of academic excellence.'

Why India needs a well-being curriculum in every school

SARAH BERRY

Every morning, nearly 250 million children step into schools in India. These schools are not only places where children learn to read and write, but also where they spend a large part of their childhood. This is where they begin to understand themselves and the world around them. For many, however, classrooms are also where stress, fear, anxiety, and the pressures of life beyond their age quietly shape their day.

Think: If a child arrives with a restless mind or a heavy heart, how can they focus, ask questions, or engage in class? How can they truly show up and learn effectively?

Learning does not happen in a vacuum. It is deeply intertwined with a child's mental health and well-being. Their inner state determines

how they pay attention, interact with peers, and respond to challenges. Feeling safe and understood is what allows them to participate, to speak up, or to try something new. Schools, therefore, have a role far beyond academics. They can equip children with the social and emotional skills that make learning possible.

On World Mental Health Day 2025, India faces a critical question: How can school-based support systems strengthen not just learning, but the mental health and well-being of an entire generation?

The cost of neglecting well-being

According to WHO, one in seven adolescents globally experiences a mental health condition. Many begin in childhood. When left unrecognised and untreated,

these challenges disrupt learning, employment, relationships, and long-term health. This is a stark reminder of the urgency of this challenge.

India has one of the largest school-going populations in the world. This scale is both a challenge and an opportunity. Without structured support to manage stress, express emotions, and build resilience, children carry these costs into adulthood.

This affects families, workplaces, and society at large. If the challenge begins in childhood, so can the solution. Schools are the strongest lever we have. They are not only centres of learning but also the most powerful spaces to embed well-being. With simple, daily well-being practices that build social-emotional skills, classrooms can become places where children learn better,

connect more deeply, and grow into healthier, more resilient adults.

A glimpse of what's possible

The Government of Tripura is leading the way by embedding daily well-being classes across all government schools in the state. Saharsh, the state's well-being curriculum supported by Labhya, gives children a structured space to practice mindfulness, regulate emotions, and learn to support each other. Early observations show calmer classrooms, reduced incidents of bullying and peer pressure, higher attendance, and improved academic performance. The government's well-being program also recently completed the world's largest study on children's mental health and well-being. While the full results will be released

soon, early findings demonstrate that these well-being classes have a direct positive impact on foundational numeracy and literacy. This evidence will help guide national policy, showing how school-based well-being can become a key part of India's education priorities.

Earlier this year, at Saharsh Utsav, a celebration of the state's well-being program, government leaders came together to showcase the impact of these efforts. Hon'ble Chief Minister Prof. Dr Manik Saha reflected, "Our future lies in the hands of our children, especially those stepping into adolescence. The way teachers will guide them and nurture them will shape the future of our nation." Early research from the program underscores this vision, showing that well-being classes are already enabling children to learn and thrive.

"It is not enough to think of education only in terms of textbooks and exams," added Shri Raval H. Kumar, IAS, Special Secretary, Education, Government of Tripura. "When we bring well-being into classrooms, we see children opening up, supporting each other, and learning with greater confidence. That is the true purpose of schooling."

If India wants an education system that equips children for both learning and life, the policy path is clear: make well-being a core part of schooling. Tripura, along with a few states such as Uttarakhand and Delhi, has shown that it is achievable and scalable. With evidence emerging from ongoing research, the case for action is stronger than ever.

The next question is not if India should act, but how quickly every government school can embed and institutionalise well-being into the school day. Because investing in children's mental health and well-being is investing in a generation that can navigate challenges, seize opportunities, and lead with empathy and courage.



Changes in H-1B visa fees will impact varied constituencies

One step back

ANUP SINHA

The recent changes in the H-1B visa application fees are part of a larger strategy by the United States of America to restrict immigration and increase employment opportunities for its citizens. There will be direct as well as indirect effects of the fee hike to \$100,000 on companies and H-1B visa-holders alike. India has been the largest beneficiary of the H-1B visa programme, receiving more than 70% of the total allotment. One can think of, in a stylised version of the market for H-1B visas, four sets of players who might be impacted. The first are Indian visa-holders and their current and future job prospects. The second set comprises Indian technology companies and their costs of providing services to clients in the US. The third group of players includes big high-tech companies based in the US and the likely impact on their hiring strategies for the best talent worldwide. Finally, there will be consequences for young American graduates entering the skilled labour market. The indirect effects are more long term in nature, depending on how university enrolment might be affected in the US and whether India's use of its own talent pool would be different from what it is now.

The H-1B non-immigration visa was first conceived of in the Immigration Act of 1990 and later modified by the American Competitiveness in the Twenty-First Century Act of 2000. The essence of this development was to enable US companies to hire skilled foreign workers for a temporary period, presumably to make up for shortages in the local market. There was a perceived gap in the number of technology graduates available and the needs of the US economy over a period of time. The number of visas to be given depended on estimates made about these gaps. Something unwritten, but fundamental, about bringing foreign workers into the US was the fact that these workers were very likely to be substantially cheaper than those available in the US market. Hence, there was an incentive to overestimate the gap. For profit-maximising business organisations, the need to minimise labour costs would always trump the political considerations of national identity.

Broadly speaking, there are two categories of Indian H-1B visa-holders in the corporate job market in the US. The first group — it constitutes the majority — works for Indian IT companies like TCS, Infosys or Tech Mahindra. They are part of the information technology



enabled services export boom India has benefited from. Of the total employment in this sector in India, they constitute a small fraction, estimated to be 3%-3%, who are sent to work overseas at the client's site. They can work for a period of three plus three years (after renewal) on an H-1B visa. While these young workers going to the US are undoubtedly good by any standards, they do not constitute the *crème-de-la-crème* of young talent worldwide. In other words, they are not the top 1% of global talent. These workers, the overwhelming majority being computer science graduates, get only about two-thirds of what a US local hire would have to be paid.

The second group of Indian technology workers is smaller than the first. But it constitutes some of the finest minds in the world. Typically, they get a good degree from India, and then enter the US on a student visa. They acquire a Master's or a PhD. They are then picked up by the top technology companies in the US like OpenAI, Google, Meta, Microsoft or Amazon. These companies want these top brains to create innovations in cutting-edge technology. They are not taken for writing codes or maintaining servers. These recruits (along with some non-Indians as well as Americans) are the best in the world and paid accord-

ingly — anywhere between 200,000 to 300,000 US dollars for starters. These people are a truly scarce resource and certainly do not displace US citizens. The companies will do anything to retain them; paying an extra \$100,000 for six years is not an issue to be even discussed. That is why there has been no noise about the fee hike from the leading technology giants.

For the first group, however, the hike in the fees is costly. In paying an additional \$100,000 for a worker who, on an average, earns somewhere between \$65,000-\$100,000 is substantial for the employer. From a purely economic point of view, the employers would still have to manage so as not to lose clients. The expected disruption, however, is not evident in the reactions of the IT companies in India. The landscape of information technology is changing rapidly and dramatically. The kind of work that was being done by workers on-site in the US is becoming obsolete. Systematic lay-offs had begun even before the fee hike. Many of the existing H-1B workers from Indian companies were not being renewed after three years. Many of these bright young workers had gone to the US with dreams of staying on in America. Indeed, in India too, there are lay-offs happening in the IT hubs. For Indian com-

panies, this is part of an important process of business restructuring.

Many Indian technology graduates already in the US who had been told that their visa support would not be renewed were eager to find alternative ways of staying on. Some headhunters and opportunistic lawyers have fished in these troubled waters. Hence, the tightening of the monitoring of immigrants in the US will mean that many of these youngsters would be compelled to return to India. However, after returning to India, it would not be easy for them to settle down. IT jobs relevant to their skills would be scarce. India will have its own ITES restructuring problems, with shrinking employment opportunities.

The final set of players who might be directly affected comprises American graduates from US universities who aspire to start their careers as software engineers. For them, the fee hike and changes in immigration may not be as good a piece of news as being promised. One estimate suggests unemployment among US computer science graduates has increased marginally. If the market is soft, and job opportunities in traditional IT are shrinking, Indian companies would offer low salaries to US graduates. In short, salaries are likely to settle between \$65,000 that Indian workers were getting and \$100,000 that US hires would start with. On the other hand, the number of new jobs in cutting-edge technology revolving around the development of Artificial Intelligence would grow. But the total number of these jobs are expected to be smaller than what the IT industry had known previously. Moreover, the skill requirements would be exceptionally demanding. In short, the picture for US graduates does not look substantially different than before.

The four sets of players are going to be affected in distinctly different ways in the immediate future. In India, the long-run benefits are going to be twofold. Indian graduates could be made more welcome in new international markets that might be keen to utilise relatively cheap but highly efficient Indian workers. Also, Indian companies could get their act together and accelerate their journey to the next phase of technological developments. The US, on the other hand, might suffer from the general restriction on skilled labour from foreign lands. These restrictions will lead to a drop in foreign students coming to US universities. In that case, the costs of higher education and a college degree would go up even further. College enrolment might drop as a result; it would then become even more expensive to hire a local youngster educated in one of the beautiful US universities.

Going Out, In Style

India needs a dedicated minister of emigration, to guide students, among others, on global opportunities

Among the categories of Indians who are already feeling a big Trump toll, students are agonisingly at the front. They saw a 45% drop in US visas issued this Aug, compared to the same period last year. And their feeling of being singled out for hurt is not baseless. For example, the Chinese received twice as many student visas in Aug than Indians. US is of course hurting itself with such actions, but that's up to American policymakers to handle. Indian ones have to address the hurt to Indians. The students who are no longer getting admissions, funding, visas have no less talent today than last year, when that pipeline was flowing meritocratically. What is urgently needed in the country is an emigration minister of India, EMI, who coordinates with MEA and states to ensure that this talent supply pipeline remains intact.

In May, *Science* published an insightful paper by Catia Batista et al on the effects of high-skilled international emigration on origin countries. It underlines how 62% of the top 100 scorers on IIT entrance exams are abroad, and how that's not been brain drain, but brain gain. Actually, not just in India but also in China, Israel and Taiwan migrants have spurred IT industries at home by providing venture capital, knowledge and network connections. Critically, the net drain/gain effect at home depends on policy responses. For example, more Indians acquiring computer science



skills than the people emigrating raised the quality of human capital, and to the extent that this was complemented by policies helping business creation, it raised population-wide wellbeing.

Now, as traditional destinations turn hostile, an EMI must guide students to fresh pastures. Maybe Ireland and Netherlands offer opportunities that US and UK no longer do. In a geoeducational environment changing day by day, India mustn't leave its students fumbling. The country's talented young need customised help that's based on researching global opportunities. Only a powerful GOI ministry can provide that. Think about why India's remittances of \$135bn dwarf China's \$50bn. Yes, our diaspora is the world's largest. Also yes, China's economy, five times ours, is able to provide more high-grade opportunities. Of course, over time, we must build the domestic bandwidth in both educational and employment excellence. But today we need to match our students with others' universities. Plus, there are critical worker shortages in several countries – Germany, Japan, South Korea – that are only going to get worse. Indians who can gain from this have to be EMI's core remit.

10/24

जापानी शिक्षा व्यवस्था में खास है 'सिनरिन-योकु'

शिक्षा नीति 2020 गुणवत्ता शिक्षा और समग्र विकास की संकल्पना के साथ 21वीं सदी की जरूरतों के हिसाब से छात्रों को तैयार करने का दिशानिर्देश करती है। हमारे गुरुकुलों में आदिकाल से ही ज्ञान-विज्ञान और शिक्षा के क्षेत्र में असंख्य प्रयोग होते रहे हैं। शिक्षा में वास्तविक अनुभवों का उपयोग अत्यावश्यक है। प्रकृति का विशाल प्रांगण इसके लिए सर्वोत्तम अवसर उपलब्ध कराता है।



जय प्रकाश पाण्डेय

सिनरिन-योकु । जापानी शिक्षा व्यवस्था में वास्तविक जीवन पर आधारित गतिविधि 'सिनरिन-योकु' का प्रचलन है। सिनरिन का अर्थ है- वन, और योकु का मतलब है - स्नान, यानी वन-स्नान। बच्चों को अपने आस-पास के पार्क, झील, पहाड़, समुद्र, खेत-

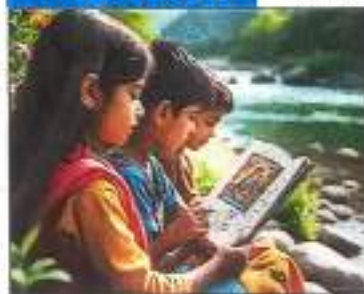
खलिहान पर ले जाया जाता है, जहां वे प्रकृति को स्वाभाविक रूप से फील करें, सुनें और देखें। इन सबसे शरीर, मन, दिमाग का प्रकृति से एक संबंध स्थापित होता है, जिससे बच्चों के संज्ञानात्मक विकास को बढ़ावा मिलता है।

पहाड़-पगडंडी । पुस्तक पगडंडी में एक यात्रा वर्तात है, जिसमें उत्तराखंड के पर्वतीय अंचलों, झरने, उछलते-कूदते नदी-नाले, इतिहास, भूगोल, लोक-संस्कृति और वहां के सीधे-सादे लोगों की कहानी है। हिमालय की वादियों का एक-एक पत्थर बोलता है। चीड़, देवदार के पेड़ों की प्रत्येक पत्ती शरारत करती है और इसकी हरियाली आप में प्राण डाल देती है। यात्रा के इस क्रम में छात्रों ने इसे महसूस किया है जो पुस्तक के माध्यम से पाठकों तक भी पहुंचता है।

विंटर लाइन । पुस्तक में दृश्यों का पूरा कैनवास पठनीय एवं रोचक है। पहाड़ों की रानी मसूरी से लेकर नाग-

कॉमनरूम

All Image



टिब्बा, मुनस्यारी, चारधाम यात्रा और फूलों की घाटी तक एक अविस्मरणीय दुनिया है। मसूरी में जाड़ों की शाम में क्षितिज पर लाल रंग की गहरी रेखा पूरे आसमान पर फैल जाती है, जिसे विंटर लाइन के नाम से जानते हैं। स्विट्जरलैंड और मसूरी में ही विंटर लाइन का मनमोहक नजारा देखा जा सकता है।

कक्षा से बाहर । पगडंडियां मन के कोमल तंतुओं को छूती हैं। इससे बच्चे

जल्दी सीखते हैं। लर्निंग आउटकम प्राप्त करने के लिए शिक्षा में कला-एकीकरण, खेल, खिलौनों और प्रकृति को नवीन शिक्षण-पद्धति के रूप में प्रयोग करने की आवश्यकता है। कलासरूम से बाहर भी सिखाने का प्रयास होना चाहिए। सभी विषय एक-दूसरे से संबंधित हैं, जो जीवन और समाज के अनेक पहलुओं को जोड़ने का काम करते हैं।

सर्वोत्तम रास्ता । प्रधानमंत्री नरेंद्र मोदी ने भी गतिविधि आधारित शिक्षण में 5B- इंगेज, एक्सप्लोर, एक्सपीरिएंस, एक्सप्रेस और एक्सेल का मंत्र दिया है। बच्चे रुचि के हिसाब से विभिन्न गतिविधियों में इंगेज हों, एक्सप्लोर करें। इन गतिविधियों एवं घटनाओं को विभिन्न दृष्टिकोण से अनुभव से सीखें। फिर रचनात्मक तरीके से अभिव्यक्त करना सीखें। इन सब को मिला कर ही सर्वोत्तम बनने का रास्ता बनता है।

(लेखक शिक्षा मंत्रालय के पूर्व डायरेक्टर हैं)

रश्मि

Decoding the Physics Nobel Prize for quantum research

Even a macroscopic electrical circuit could display quantum behaviour when carefully shielded from environmental noise, writes **B K Singh**

A century-old branch of physics, quantum mechanics, explains phenomena that remain mysterious under classical mechanics. Among its counterintuitive predictions is tunnelling—a process that allows a particle to pass straight through an energy barrier that it classically should not cross.

This year's Nobel Prize in Physics has been awarded to three American physicists—John Clarke of the University of California, Berkeley, Michel H. Devoret of Yale University and the University of California, Santa Barbara, and John M. Martinis of the University of California, Santa Barbara—for their pioneering experiments in the mid-1980s that revealed macroscopic quantum tunnelling and quantised energy levels in a system large enough to be visible to the naked eye.

When these experiments were conducted in 1984 and 1985, Martinis was a PhD student, Devoret a postdoctoral fellow, and Clarke their supervisor. Their research demonstrated that even a macroscopic electrical circuit could display quantum behaviour when carefully shielded from environmental noise. Two of the three laureates also went on to play key roles in industry: Devoret now serves as Chief Scientist at Google Quantum AI, and Martinis led Google's Quantum AI Lab until 2020.

Quantum mechanics forms the foundation of modern technology and continues to demonstrate its relevance in new domains. Transistors in microchips, lasers, cameras, cell phones, and fibre-optic networks—all integral to everyday life—are direct outcomes of quantum principles discovered during the twentieth century. Today, these principles are driving the next wave of innovation in quantum technology, including quantum computing, cryptography, and sensing.

Particles the size of atoms, electrons, protons, or neutrons behave very differently from the objects we observe daily. Their actions are governed not by Newtonian laws



The 2025 Nobel Prize in Physics was shared between three scientists: John Martinis, Michel H. Devoret and John Clarke.

but by the probabilistic rules of quantum mechanics. They can tunnel through barriers, exist in multiple states simultaneously, and occupy discrete energy levels rather than a continuous spectrum. A familiar analogy helps: when a ball is thrown against a wall, it bounces back; but a quantum particle, under the right conditions, has a finite probability of appearing on the other side of the wall without ever "breaking through" it.

Drawing from existing research

In 1973, Brian Josephson received the Nobel Prize in Physics for discovering that an electric current could flow between two superconductors separated by an insulating layer—a setup now known as a Josephson junction. This device became a cornerstone of precision measurement and quantum electronics, enabling scientists to explore the delicate boundary between classical and quantum phenomena.

Building on Josephson's work, Clarke, Devoret, and Martinis used a similar con-

figuration in their 1984–85 experiments. Their superconducting circuit consisted of two superconductors separated by an insulator and connected to a voltmeter that initially read zero. Under normal conditions, no current should cross the insulator, yet in a superconductor—where electrons move collectively as one coherent quantum wave—current can flow without resistance. The researchers meticulously isolated the setup to prevent interference from external noise that could destroy the fragile quantum effects.

Their measurements showed that the electrons in the circuit occupied quantised energy states. Each transition between states involved the absorption or release of a fixed quantum of energy, which was reflected in the voltmeter readings. The absence of intermediate values confirmed that the system's energy levels were discrete rather than continuous—a hallmark of quantum mechanics.

The experiment also revealed macro-

scopic quantum tunnelling: the collective quantum state of billions of electrons passed through the insulating barrier, a feat analogous to a single particle tunnelling through a wall. The observation proved that quantum effects could manifest in systems far larger than individual atoms or particles, provided they were sufficiently isolated and cooled.

The question of how large a system can still exhibit quantum behaviour remains open. The 1984–85 experiments by Clarke, Devoret, and Martinis provided the clearest demonstration yet that macroscopic objects, under precise conditions, can display quantum mechanical properties. This insight laid the groundwork for creating quantum bits (qubits)—the basic units of information in quantum computers, which exploit superposition and entanglement to perform operations that classical computers cannot efficiently handle.

Quantum computing, once confined to theoretical physics and laboratory prototypes, is now entering real-world testing and industrial research. Sectors ranging from energy, logistics, and materials science to artificial intelligence and cybersecurity are exploring how quantum algorithms might solve problems that classical computing cannot. Potential applications include secure quantum communication, ultra-sensitive sensors, new materials and drugs, climate modelling, financial forecasting, and even carbon capture technologies.

The discovery honoured by this year's Nobel Prize bridges a profound scientific divide—showing that the bizarre behaviour of subatomic particles can, under the right conditions, scale up to the macroscopic world we inhabit. It is a reminder that the principles of quantum mechanics, once thought to apply only to the invisible realm of atoms, continue to expand the boundaries of what technology—and imagination—can achieve.

(The writer is a former bureaucrat and a science communicator)

05/11/9

Unemployment is still a core issue in Bihar

Unemployment has consistently emerged as one of the most pressing political issues in Bihar. In the last two Assembly elections, jobs and livelihood were among the top concerns. In 2015, post-poll surveys conducted by Lokniti-CSDS showed that 'unemployment/jobs' was the most important issue for 9.1% of voters. By 2020, this percentage rose to nearly 21.0%, making it the second most important issue for voters. With the employment scenario still grim, it is an issue that is likely to dominate voter priorities in the forthcoming polls.

The situation needs to be looked at objectively, for which official statistics are useful. Under the Periodic Labour Force Survey (PLFS), the latest State-level indicators on employment are the April-June 2025 quarterly report and the July 2023-June 2024 annual report, with insights on Bihar.

Looking beyond the unemployment rate

The quarterly and annual releases cite Bihar's unemployment rate as 5.2% and 3%, respectively, whereas it was 5.4% and 3.2%, respectively, at the national level for ages 15 and above. To the casual reader, Bihar's employment/unemployment picture seems decent to good. However, such a superficial reading is misleading. To truly understand employment conditions, one must understand three interrelated indicators in the PLFS – Worker Population Ratio (WPR) or share of the population that is employed; Labour Force Participation Rate (LFPR) or the share of the population either employed or actively seeking work; and Unemployment Rate (UR) or share of the labour force that is unemployed and actively looking for work.

Looking at the UR in isolation conceals the true picture. The same quarterly and national releases cite the WPR for Bihar at 46.2% and 51.6%, respectively while the national WPR is 52% and 58.2%, respectively, which shows that the share of those employed in the working age population is much lower in Bihar.

On checking the WPR and LFPR in the table, Bihar has low WPR, low LFPR, and therefore low UR. A more holistic interpretation is grim because many in Bihar are not working (low WPR), and many are not even looking for work (low LFPR).



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Since those not working are not even looking for work, the unemployment rate looks deceptively low. This is a classic manifestation of the "Discouraged Worker Effect" wherein people without jobs lose hope of finding employment opportunities and completely withdraw from the labour force.

A comparison of Bihar with similar/comparable States strengthens the inference and shows how bad employment conditions are in Bihar. But it is important to compare Bihar against States of a similar size and economic background. In this, two factors are crucial in determining similarity: population and per capita income.

For a meaningful comparison, Bihar was grouped with nine large, low-income States (population above three crore as in the Registrar General of India's 2024 projections, per capita income below national average for 2025-25).

There are nine States that fall under this criteria, which are Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh and West Bengal.

When Bihar's indicators are compared with the chosen group of States, the results are alarming. Bihar ranks the lowest across WPR and LFPR. Uttar Pradesh fares marginally better but still hovers near the bottom.

The quarterly PLFS (April-June 2025) shows that among youth (15-29 years), the picture is even bleaker: only 28 out of 100 are working. Bihar is at the bottom in terms of youth work participation and youth labour force participation. For a generation that should be building its future, the doors of employment remain closed.

Since quarterly figures may be influenced by seasonal fluctuations in employment, it is important to look at the annual PLFS estimates as well. Quarterly estimates are based on Current Weekly Status, in which the reference period used to determine a person's employment status is just seven days.

The annual report also presents Usual Status: principal/subsidiary status), or figures which give a more comprehensive and stable picture of employment over a long term, minimising the distortions caused by short-term variations such as festivals, illness or crop cycles. It also captures people's subsidiary work. However, these annual figures too reinforce the same conclusion. For

those aged 15 years and above, Bihar's WPR stands at 51.6% and LFPR at 53.2%, which are abysmally low. Only Bihar and Uttar Pradesh fall below 60% in WPR.

The situation is grave for women. Bihar's female WPR is only 30.1%, or out of 100 women aged 15 years and above, only 30 are working. The situation is even more distressing for young women. In the 15-29 age group, Bihar's female work participation rate stands at 31.2%, while neighbouring Jharkhand records 49.3%, which is nearly 20 percentage points higher.

The quality of jobs in Bihar is equally troubling. Only 8.7% of workers are engaged in regular wage/salaried jobs, the lowest among comparable States. Bihar is the only State – not just in this group but also in the entire country – with a single digit proportion. At the same time, 23.8% of workers are employed as casual labourers, the highest share after Odisha across these States. This indicates a lack of secure and formal employment opportunities.

Such outcomes are in stark contrast to the claims of the National Democratic Alliance, which often highlights the formalisation of the economy as one of its achievements. In Bihar, however, the labour market remains overwhelmingly informal, insecure and poorly remunerated.

Migration and the missing numbers

A caveat must be kept in mind while interpreting Bihar's employment indicators. The PLFS counts only those individuals residing in the State during the reference period. The employment picture could have been better had the PLFS been capturing migration as well.

The grim labour market outcomes cannot be separated from Bihar's governance record. Chief Minister Nitish Kumar's government has failed to improve literacy and human capital formation. The same PLFS (annual) shows Bihar's literacy rate at only 73.2% for the 6-plus age group, which is far below the national average. Without significant improvements in education and skills, the State cannot hope to generate meaningful employment opportunities.

Despite frequent announcements, investment summits and promises of industrial revival, little has materialised on the ground. Mr. Kumar's political manoeuvres and shifting alliances have yielded little tangible benefits for Bihar's economy. The State has underperformed in education, job creation, industrialisation and formalisation.

The employment crisis in Bihar is not a matter of perception but one of hard evidence. PLFS data consistently reveal that Bihar lags in all key labour market indicators. Mr. Kumar's tenure of nearly seven decades as the Chief Minister has failed to address these structural weaknesses. For a State with such a young population, this represents not just a missed opportunity but a potential social crisis in the making.

Bihar urgently needs a comprehensive strategy to revive education, create formal jobs, and stem the outmigration of its workforce. Anything short of this risks perpetuating the cycle of poverty, migration, and underdevelopment that has long haunted the State.

Bihar needs a strategy to revive education, create formal jobs and stem the outmigration of its workforce

A true picture

The employment crisis in Bihar is not a matter of perception but one of hard evidence

	Quarterly (Apr-June 2025)				Annual (July 2023-June 2024)**							
	WPR	LFPR	WPR (15-29)	LFPR (15-29)	WPR	LFPR	WPR (15-29)	LFPR (15-29)	Female WPR	Female LFPR	Proportion of regular wage/salaried workers	Proportion of casual labour workers
Assam	57.9	68.8	49.2	48.2	54.3	68.9	54	51.3	48.1	50.2	16.9	19.7
Bihar	46.2	46.9	28.3	33.9	31.8	33.2	31.3	34.6	30.1	31.2	8.7	23.8
Chhattisgarh	55.1	59.8	39.6	48.3	49.7	71.5	57.8	61.7	58.1	59.5	47.8	50.6
Jharkhand	47.3	48.4	30.7	35.6	63	63.8	49.3	52.1	40.6	45.8	38	26.6
MP	54.8	57.2	41.2	45.8	68.3	68.9	56.6	58.1	51.9	52.3	37.4	36.1
Odisha	59.3	52.7	33.7	42.1	62.9	64.9	46.3	52.1	48	49.4	33.7	37.6
Rajasthan	53.0	52.1	35.5	45.4	61.7	64.4	44.1	50.4	48.9	50.8	31.7	26.5
Uttar Pradesh	47.7	50.2	30.1	37.1	55.1	58.9	39	42.9	33.6	34.5	28	21.8
West Bengal	54.9	57	39.2	44.7	59.6	63.1	41.6	49	33.2	40.4	28.1	31.2
All-India	52	55	35.8	42	58.2	60.1	41.7	46.5	40.3	41.7	25.6	28.8

Source: PLFS, Ministry of Statistics and Programme Implementation, Government of India. All figures are in %, unless otherwise specified. WPR and LFPR are reported for all persons aged 15 years and above. * Current Weekly Status (CWS). ** Usual Status (US).

EQUAL
STEPS

INTERNATIONAL DAY OF THE GIRL CHILD

Let Her Dream, Let Her Lead

As India's young girls rise from villages and towns alike, their education and empowerment promise a stronger, fairer, and more prosperous nation



RAJAN SANKAR

THE WRITER IS A PUBLIC HEALTH AND NUTRITION RESEARCHER. HE WAS A FORMER DIRECTOR OF NUTRITION AT TATA TRUSTS

Her wings need not be given, only unbound — for she already knows how to fly

On October 11, the world observes the International Day of the Girl Child — a day to celebrate the spirit of girls whose bright eyes hold dreams that can light up a nation. Think of Priya, a 14-year-old from a village in Rajasthan. She walks miles to school each day, hoping to become a doctor. Her story mirrors millions across India. We have over 120 million girls aged 10 to 19 — they hold the key to our country's future. Yet poverty, custom, and lack of opportunity still dim their light.

The United Nations established this day in 2012 to highlight the challenges girls face — early marriage, lack of education, and violence. For India, home to 253 million adolescents, this observance carries special weight. Progress is visible: more girls in school, fewer child marriages, better health awareness. Yet gaps remain. The *Economic Case for Investment in the Well-being of Adolescents in India*, released in April 2025 by the Union Health Ministry and the Partnership for Maternal, Newborn & Child Health (PMNCH), made one fact clear: every rupee spent on girls' health and skills yields up to ₹880 in social and economic returns. The future depends on how we invest in them.

India's commitment draws from global goals like the UN's Sustainable Development Goals — SDG 5 on gender equality and SDG 4 on quality education. These are not just ideals; they demand action to end bias, ensure safety, and value women's work. The Beijing Declaration of 1995 added strength to this call, urging access to schooling, healthcare, and dignity for every girl.

At home, India has taken steady steps. Beti Bachao Beti Padhao, launched in 2015, combats female foeticide and promotes education, improving the child sex ratio by 10 per cent across 600 districts. The National Education Policy 2020 envisions inclusive classrooms and digital learning for girls. In health, the Rashtriya Kishor Swasthya Karyakram (RKSK) now reaches over 25 million youth each year with guidance on nutrition, well-being, and mental health.



Change must begin at home. Families should celebrate daughters' achievements as they do sons'

These policies have changed lives. Girl literacy rose from 65.5 per cent in 2011 to 70.3 per cent (NFHS-5). More girls now attend secondary school — 78 per cent enrolment — and child marriage rates have halved to 23 per cent. Iron supplements now reach nearly 80 per cent of schoolgirls. The PMNCH report estimates that smart investments could save 1.2 million young lives by 2030. Healthy girls mean a stronger workforce and a richer India.

But the road ahead is uneven. Data from the Beijing+30 review shows weak tracking of girls' needs, making interventions harder. One in five adolescents suffers from stress or sadness, often intensified by pressure and gender bias. Despite reforms, 14 per cent of girls drop out after Class 8 — in rural Bihar and Rajasthan, up to 20 per cent. Reasons include early marriage, housework, or lack of toilets in schools. Only 13 per cent of village girls finish high school.

Health gaps run deep. Over half of teenage girls are anaemic; 45 per cent use unsafe menstrual methods. India has just 0.7 psychiatrists per lakh children, while up to 20 per cent of adolescents face men-

tal health issues. Violence adds another shadow — one in three girls faces abuse before 18, and online bullying is rising. The digital divide, too, is stark: only 24 per cent of rural girls use the Internet, limiting access to learning and opportunity.

Still, hope endures in small victories. Take Sunita Kumari from Bihar. At 14, orphaned and burdened with chores, she joined Project Nandhi Kali, a Mahindra Foundation initiative providing books, uniforms, and mentoring. She topped Class 10 and now trains as a nurse. "School didn't just teach letters; it freed my spirit," she says. Stories like hers show how opportunity can transform lives.

Partnerships amplify progress. UNICEF's Gender Action Plan reaches millions through school support and safe-space programmes, reducing early marriages and keeping girls in classrooms. The Bill & Melinda Gates Foundation, with the Confederation of Indian Industry (CII), advances nutrition and mother-child health. The Children's Investment Fund Foundation's Girl Capital project invests in adolescent education and livelihoods. Its *Educate Girls* programme in Rajasthan reached 7,300 out-

of-school girls in 166 villages, enrolling and retaining more than expected. One girl from Bhilwara, once withdrawn for marriage, now leads her class and dreams of teaching. Such efforts, blending policy, philanthropy, and local participation, prove how partnerships can power change.

Yet policies alone cannot close the gap — sharper action must follow. The PMNCH report calls for ₹4,000 crore annually for adolescent programmes focusing on nutrition, mental health, and hygiene — yielding 15-fold returns. Strengthen Beti Bachao Beti Padhao through better ground-level checks. Ensure all schools have toilets, computers, and safe transport. Expand RKSK to 10,000 clinics, with menstrual health and mental wellness embedded in curricula.

Fresh thinking can deepen impact — mentorship apps linking city professionals to village girls, skill-building in coding and finance, and community drives like UNICEF's safe spaces, which have cut dropout rates by 25 per cent in pilot areas. The Gates-CII collaboration also shows how technology and local outreach

can strengthen public health for young mothers.

But change must begin at home. Families should celebrate daughters' achievements as they do sons'. Schools must be places of safety and trust. Villages must reject early marriage and allow girls to dream. Citizens can play a role too — sponsoring education through NGOs like Educate Girls, joining UNICEF initiatives, or simply talking about equality at home. The World Bank estimates that closing gender gaps could add ₹80 lakh crore to India's GDP by 2035. Equality is not just moral — it's economic sense.

Imagine an India where Priya heals in her clinic. Sunita teaches in her village, and that Bhilwara girl inspires a new generation. Empowered girls become leaders, innovators, and change-makers, driving India toward inclusive growth.

This day is more than a date — it is a promise to our daughters. We have written the preface with policies and pledges; now, we must fill the pages with action. Let no shadow dim their light. Every girl must fly — free, fearless, and bold. The horizon is here.

Views expressed are personal

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Reviving the spirit of discipline through a better-trained National Cadet Corps



**GURMEET
SINGH**

One of the most useful youth organisations created immediately after independence was the National Cadet Corps, the genesis of which was to create a force of young minds at the national level to train young boys and girls to be better citizens and future leaders of our vast country in all walks of life, including the defence forces. This was rightly realised by our leaders through a committee under Pandit H N Kunzru in 1946, and subsequently, after a series of meetings at various levels, it came into existence on 16th July 1948 under the NCC Act XXXI of 1948 under the Ministry of Defence with the following aims:

- To develop character, comradeship, ideals of service and capacity for leadership in the youth of the country.
- To stimulate interest in the defence of the country by providing service training to youth.
- To build up a reserve to enable the Armed Forces to expand rapidly in a national emergency.

The National Cadet Corps was given an inter-service image in 1950 when the Air Wing was added, followed by the Naval Wing in 1952. While elementary military training was given to school students (cadets of the Junior Division), college students (cadets of the Senior Division) were trained as potential officers of the three wings — Army, Navy and Air Force. Following the Chinese Aggression, to meet the requirement of the nation, National Cadet Corps training was made compulsory in 1963. However, on the resistance of students against compulsory National Cadet Corps training and also on the suggestions of some Vice-Chancellors, entry into the NCC was again made voluntary in 1968.

Till 1968, NCC's Senior Division was being taken very seriously, and good regular officers were given the charge to look after the management at the Directorate, Group and Unit levels. The resources, stores, logistics, furniture and office accommodation in respect of Group Headquarters and Units were being taken care of in a very proper and planned manner.

The whole NCC under the first DG onwards was being planned and expanded in a very careful and controlled manner, under the command and control of regular and efficient officers, keeping in mind the needs and financial resources of the country. After this, the NCC expanded in a very haphazard manner, mindlessly from 23,000 in 1950 to about 14 lakh cadets at present, with the aim to expand this to about 17 lakh in the next three years. This expansion of Units, Groups and

the Directorates in different states was never properly planned, without looking at the resources. There were no proper buildings to house these NCC establishments during the period of this mindless expansion, till about 1988.

There were very few regular officers to look after these various Units. Many retired and re-employed officers were given the charge of Units and Groups. These officers had no interest in the upkeep of these NCC offices and in imparting serious training to cadets. The NCC cadets were not being given the right picture about officers' lifestyles, officer-like qualities and turnout. The quality of training was far below the desired standard. Most of the service-related issues were either neglected or presented in a very shabby manner. Probably no Unit or Group was fully equipped to give proper training in the right spirit, either because of the lack of the right kind of staff or lack of resources.

Other than in some big cities, there was no semblance of training equipment and resources at the local levels in rural areas. The officers posted in these rural areas were least interested in the development of NCC. They were just passing their time without proper teaching of service matters and of military training schedules, particularly in rural belts. In addition to service subjects, very little attention was

being paid to some of the important aspects like parade training and turnout. These were being neglected everywhere.

The impression was given that parade training was a waste of time and served no purpose other than physical fitness, which is covered under sports. Parade training is one of the most important aspects of the training that helps in developing focus and concentration among the youth but unfortunately has not been paid due attention. It was generally seen that anyone taking parade training seriously had the best focus in their day-to-day schedule as compared to others. It has been seen, though not properly documented, that those who take parade training seriously performed much better in all activities as compared to those who neglected it. In the big cities, the Units were reasonably well-equipped but in rural areas things are in an utter state of neglect. The entire NCC logistics in many states are in a state of absolute neglect. Looking at the benefits, these are sheer minimal compared to the amount being spent. The audit carried out every year into these offices is also a matter of questionable sanctity. Too many senior officers are holding charge of NCC activities who are not able to pay proper attention towards management and planning, which can be better looked after by officers at the Group Commander level. On the general front, the refreshment provided is highly inadequate and should be improved in quality and quantity. On the brighter side, there are some excellent and useful activities provid-

ed to cadets which are impossible to get otherwise, like the Republic Day Camp, Advance Leadership Camp (most useful for personality development), Hiking, Trekking, Rock Climbing Training Camp, Yachting Regatta and other such activities specialised in the Naval and Air Wings.

One of the best programmes established is the Youth Exchange Programme, where cadets visit foreign countries, thereby helping in international understanding. Cadets are being sent abroad regularly. The selected candidates also get opportunities to have overseas deployment, but unfortunately, the opportunities for all these above-mentioned programmes are given only to a handful of cadets from our country and need to be expanded further to be available to a larger section.

A large section remains all through without these benefits. A large number might not have even heard about these activities because of the poor training uniformly being provided all over.

Though on paper there is an opportunity for cadets to become commissioned officers after clearing the 'C' Certificate exam, the number remains dismissively low. This should also be expanded further to benefit a larger number of cadets. Finally, when we look at the list of DG NCC, in the initial phase some had a tenure at the 2-star rank level for close to 15 years, which is not understandable. Were there no other suitable young officers at that stage, or were these officers not considered fit for further promotion or for any other suitable assignment that they were stuck in the NCC for so long? As a consequence, these long tenures made these officers uninterested in proper planning and development of NCC as compared to an officer who would be much more enthusiastic towards this if given a shorter tenure. The cadet's handbook has some excellent suggestions, but no one at any level ever monitors it. If we need to revamp this institution of NCC in the proper direction, we need to have excellent officers to encourage students through their personal examples. After considerable efforts at universities and academic levels, approval could be obtained for giving up to four credits towards their graduation degree under NEP-2020, so that we are able to get eventually not only wonderful defence officers but also excellent citizens for our nation, which is equally important for our nation's all-round development.

It can be said that NCC is the finest organisation for youth for overall personality development if proper training is imparted, but there is a huge gap between the planned schedule and the actual work being done, and therefore its performance can be rated as far below the level of satisfaction.

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The Talent Hunt

The difference lies in the way Indians are taught to think—memorisation of facts, and rote learning are rewarded in examinations, while originality is frowned upon. Our companies seldom launch new products, relying mostly on copying goods being manufactured abroad. No wonder, mediocrity rules the roost; graduates that our universities churn out in abundance are mostly good only for basic repetitive jobs, and can never hope to command even one per cent of Deitke's asking price. Donald Trump's US\$100,000 premium on H1-B visas is specifically designed to prevent such people from entering the US job market

Matt Deitke, a 24-year-old AI prodigy, was recently hired at a record US\$250 million (roughly Rs.2250 crores), payable over four years, by Meta Platforms Inc. Deitke had turned down Meta's initial offer of US\$125 million (roughly Rs. 1125 crores); Meta CEO Mark Zuckerberg had to personally persuade Deitke, and double his offer, before Deitke agreed to join. Deitke's is not an isolated case, according to insiders, Zuckerberg has compiled a list of talented researchers working in Silicon Valley's AI labs, who are being offered packages in excess of US\$100 million (roughly Rs.900 crores) to defect to Meta. The tech billionaires of the last generation, Bill Gates, Steve Jobs, Elon Musk and Mark Zuckerberg, to name a few, were all self-made, and created value out of nothing. India, which produces more than two crore STEM (Science, Technology, Engineering and Mathematics) graduates annually, boasts of no similar success story. No one can deny our talent: top US tech companies, Microsoft (Satya Nadella), Alphabet (Google) (Sunder Pichai), IBM (Arvind Krishna), Adobe (Shantanu Narayen), T-Mobile (Srinivas Gopalan, Micron Technology (Sanjay Mehta), Palo Alto Networks (Nikhil Arora), and Vertex Pharmaceuticals (Reshma Kewalramani), are helmed by Indians.

Yet, despite the Government's incentives, very few tech start-ups have done really well in India. Commerce Minister Piyush

Goyal, succinctly pointed out at the 'Startup Mahakumbh' in April 2025, that Indian start-ups were developing food delivery and online betting apps, while Chinese start-ups were developing machine learning, robotics and next-generation factories.

Perhaps, the difference lies in the way Indians are taught to think—memorisation of facts, and rote learning are rewarded in examinations, while originality is frowned upon. Our companies seldom launch new products, relying mostly on copying goods being manufactured abroad. No wonder, mediocrity rules the roost; graduates that our universities churn out in abundance are mostly good only for basic repetitive jobs, and can never hope to command even one per cent of Deitke's asking price. Donald Trump's US\$100,000 premium on H1-B visas is specifically designed to prevent such people from entering the US job market.

These anomalies would have been good only for table talk, had they not been directly related to our dream of becoming 'Viksit Bharat' in the next twenty-two years. History shows that a country becomes great if it truly excels in at least one field; the eighteenth and nineteenth century saw Britain forge ahead by virtue of its industrial development and military power, the twentieth century had the US lead in research and new technology, and the early twenty-first century has seen China emerge as the factory of the world.

The Government aimed to bring India into the Viksit category by growing the manufacturing sector with initiatives like Make in India (2014), Production Linked Incentive (PLI) (2020) and Design Linked Incentive (DLI) (December 2021). Make in India had two major objectives viz. creation of 10 crore new jobs in the manufacturing sector, and enhancing the share of manufacturing in GDP, from 15 to 25 per cent, in ten years. However, after ten years of Make in India, the share of manufacturing in GDP still hovers between 16 to 17 per cent, and there has been little employment generation in the manufacturing sector.

Rather, according to NSSO sample surveys, manufacturing employment has declined from 12.6 per cent of total employment in 2011-12 to 11.4 per cent in 2022-23. PLI and DLI, have fared little better; even with a budget of Rs. 296 lakh crore, success has been partial—as revealed in its fourth review, PLI seems to have degenerated into promoting local 'assembling' of smartphones with imported components, resulting in huge export values, but little value addition.

An analysis would reveal that Government alone is not responsible for the limited success of its flagship initiatives. The Government liberalised the FDI regime, introduced single-window clearances, reduced compliance burdens, decriminalised a host



of offences, drastically cut corporate tax rates, invested huge amounts in infrastructure development, and reduced both the Repo Rate and Cash Reserve Ratio, by 1 per cent in the last few months, but response from industry was sluggish; the Finance Minister loudly wondered why private investment in manufacturing was not forthcoming, and her Chief Economic Advisor rued the tendency of Indian industrialists to invest abroad, but not in India.

However, there is a basic drawback with a development model based on manufacturing and exports, imagined by our planners. Firstly, it is a concept copied from China, which had perfected it in the last fifty years. It served China well till the other countries noticed that China had raced ahead by flooding their markets with cheap goods, killing their manufacturing industries.

Only recently, the US and Britain realised that their manufacturing bases had eroded; they were producing hardly any steel, the basic raw material for industry—US had produced only 88 million tonnes of steel in 2024, and UK a meagre 4 million tonnes, while China had produced more than 1 billion tonnes, and India had produced 150 million tonnes. Over the years, China took full advantage of the West's luxury; till a week ago, despite being the world's second largest economy, China graded

itself as a 'developing country' at the WTO, that entitled it to a host of undeserved benefits. Significantly, the US had withdrawn China's 'developing country' tag only in 2020—at the end of the first Trump presidency.

With a wave of protectionism sweeping the world, there is little chance that India can replicate the Chinese model. Additionally, China became the factory of the world by operating at very thin margins, for example, when China was the sole producer of Apple iPhones, only four per cent of the profit on sale of an iPhone accrued to China. Of course, China made up by copying proprietary designs of its principals, and rolling out cheap substitutes of luxe products.

Also, being a command economy, China

could set prices to benefit itself and discourage rivals. Most importantly, as early as 2006, China realised that being a copycat, a fast follower or a 'fast tech dragon', could succeed only to a point, and so it formulated the 'Outline of National Medium- and Long-term Science and Technology Development Plan (2006-2020)', which identified innovation as the new national strategy.

Great efforts were made to further this initiative, the Thousand Talents Plan (2008), aimed at bringing back expatriate scientists and researchers, was one such project. The Thousand Talents Plan, offered returnees a one-time settlement bonus of up to 1 million yuan (Rs.1.25 crore), with additional research funding ranging from 3 (Rs.3.75 crore) to 5 million yuan (Rs.6.25 crore). Relocation packages included subsidised housing, paid return home trips, employment for spouses, and educational support for children.

In the last ten years, more than 7000 scientists and entrepreneurs, both Chinese and foreign, have taken up positions under the Thousand Talents Plan. No wonder, China has triumphed in high-tech industries, such as electric vehicles, clean energy and lean AI—and Trump has banned Chinese students from attending hi-tech courses in US universities.

A totally different ecosystem operates in India. Nobel Laureate Hargobind Khorana, wanted to work in India, but was never offered a suitable position. Instead of being called upon to play a role in policy formation, Nobel Laureates Amartya Sen and Abhijit Banerjee, are routinely derided for their liberal views. Ace innovator and social reformer Sonam Wangchuk, has been jailed under the draconian National Security Act (NSA). Even investors get short shrift; after Amazon announced an investment of US\$1 billion in India, the Union Commerce Minister lambasted Amazon, saying inter-alia, that Amazon was not favouring India by its investment, for added effect, the minister accused Amazon of predatory pricing.

It is rather late in the day for India to join the AI race. Also, India does not have the hundreds of billions of dollars required to buy top talent and infrastructure, to be a serious contender. However, many other avenues are open for innovation; agriculture being a prime example. Our agricultural productivity is one of the lowest in the world, enhancing it will transform agriculture from a subsistence activity to a remunerative one. Waterlogging, soil alkalinity etc. are problems waiting for a solution. Then, our dirty and overcrowded cities face myriad problems, which keep us from becoming 'Viksit'—and which can be resolved by innovation.

Finally, innovation is required to take us out of our present rut; as Henry Ford had said a century ago: 'If you always do what you've always done, you'll always get what you've always got.'



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Taliban strips Afghan girls of their last lifeline to education



GORDON BROWN
FORMER PRIME MINISTER,
UNITED KINGDOM

FOUR years after the Taliban excluded girls and women in Afghanistan from secondary and higher education, the regime shut down the internet, depriving them of one of their last opportunities to learn. What started as a ban in a few provinces to "prevent immoral activities" escalated in a nationwide internet blackout on September 26, 2025. While access was restored on October 1, many Afghans say that service remains slow and unstable.

The nearly 3.2 million Afghan girls barred from attending school beyond the primary level now live in fear that they will lose their last lifeline to an education.

Remote learning is one of the few available alternatives (together with underground and homeschooling) for those girls to receive a secondary education while remaining in the country.

Over the past four years, Education Cannot Wait (ECW), which I — once chaired, UNICEF, and

strategic partners have provided education to 1,88,000 Afghan girls excluded from the classroom by scaling up community-based and accelerated learning programmes in remote and underserved areas.

But many of these programmes have an online component and, thus, are almost impossible to continue when the Taliban curtails access to the internet.

While the regime has yet to give an official explanation for the recent shutdown, it knew that such a cut would deny Afghans — in particular, girls and women — access to knowledge from the outside world.

The internet blackout is only the latest example of the Taliban's increasingly brutal assault on the rights of girls and women.

After banning girls over the age of 12 from getting an education, the regime barred women from most forms of employment, excluded them from nearly all public spaces and prohibited them from traveling anywhere without a male chaperone.

The Taliban's draconian dress code requires women to "wear burqas, covering them from head to toe."

By 2024, the Taliban's edicts became even more repressive. Women — already banned from speaking in public — were prohibited from praying aloud or reciting the Koran in the presence of other women.

In 2023, as part of a broader ban outlawing the teach-



CRUCIAL With internet blackout, the Taliban is depriving girls of even online education, *Sebastian Joss*

ing of human rights and sexual harassment, the Taliban removed books written by women from universities. This included titles like *Tafseer in the Chemical Laboratory*, which the regime found to be of "concern" due to "anti-Sharia and anti-Taliban policies."

Against this backdrop of tightening restrictions, access to the online world was one of the few freedoms Afghan girls and women were allowed. The only hope left for us was the Internet and online learning," one woman from the northern province of Takhar explained to the BBC. "When I heard that the Internet had been cut, the world felt dark to me," she added.

Another woman, who lives in an eastern province, described feeling "helpless" in the face of internet outages: "My sisters and I

dreamed of finishing our education and helping our father financially, but now... we all sit at home doing nothing."

The Taliban's cruel policies and human rights violations have long-term consequences not only for Afghan girls and women, but also for the country's economic growth.

According to UNESCO, the lost income from the exclusion of women and girls from education will total \$6.6 billion — equivalent to two-thirds of today's GDP — by 2035. Such a huge loss would be catastrophic for a country where roughly 85 per cent of people live on less than \$1 a day, and around half the population needs humanitarian assistance to survive.

This is not the future Afghans want. A recent United Nations Women

report found that 85 per cent of the country's population supports girls' secondary schooling.

Afghan girls continue to risk arrest by sharing their powerful testimonies and demanding the right to study in ECW's #AfghanGirlsVoice campaign.

The UN must urgently classify gender apartheid — defined as "inhumane acts committed within the context of an institutionalised regime of systematic discrimination, oppression, and domination by one group over another or others, based on gender, and committed with the intention of maintaining that regime" — as a crime against humanity.

Such a move would represent an important step towards holding the Taliban accountable for its systemic efforts to segregate, control and silence girls and women in Afghanistan.

Muslim-majority countries have vociferously criticised the Taliban's education ban.

Qatar, which has long served as a mediator between the regime and the West, expressed deep concern about the policy.

Saudi Arabia also condemned the decision, which it described as "asterisking in all Islamic countries" and as "contrary to giving Afghan women their full legitimate rights, foremost of which is the right to education."

The United Arab Emirates

pushed for the ban's swift reversal, denouncing it as a violation of "the teachings of Islam."

Islamic teaching does indeed support girls' education. "Iqra", meaning to read, is the first word of the Koran.

"The seeking of knowledge is obligatory for every Muslim," states Al-Tirmidhi, Hadith 74, one of the six canonical teachings in Sunni Islam and a sign of the faith's deep commitment to learning by men and women alike.

In accordance with these beliefs, the Organisation of Islamic Cooperation is working "to unite scholars and religious authorities in the Islamic world against the decision to prevent girls from education."

Although the Taliban's internet blackout was abruptly lifted, the expansion of its assault on girls' education into the online realm is a worrying development.

The regime's leadership, in particular its religious leaders who reside in Kandahar, must be reminded as often as possible that there is no foundation in Islamic law for the Taliban's efforts to revoke the right to learn.

And the international community must take steps to hold the Taliban accountable, especially as its activities penetrate well into Pakistan, and before it pushes its inhumane policy to yet another new extreme.

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The Taliban's cruel policies have long-term consequences not only for Afghan girls and women but also for the country's economic growth.

Nobel awards

Indubitably the most prestigious prizes in the world, the Nobels, are awarded each year to individuals or groups for outstanding contributions across fields including Physics, Chemistry, Medicine, Literature, Peace, and Economic Sciences. Five of the six awards for 2025 have been announced, with only the Economics prize remaining, which will be made public on October 13. There were 338 candidates for the Peace prize alone this year, including 244 individuals and 94 organizations, which indicate that the field from which the six winners are ultimately selected is widening, and also the fact that the Nobels are being increasingly given to multiple winners who share the substantial prize amounts between themselves. In accordance with such a trend, the 2025 Nobel for Physics went to three recipients, John Clarke, Michel H Devoret, and John M Martinis, all professors at American universities who were awarded for their pioneering work in quantum mechanics that paved the way for devices like the cellphone and camera. Susumu Kitagawa, Richard Robson, and Omar M Yaghi were awarded the Chemistry Nobel for developing molecular structures used by researchers to "harvest water from desert air, extract pollutants from water, capture carbon dioxide and store hydrogen". Kitagawa teaches at Kyoto University, Robinson at Melbourne University, and Yaghi at the University of California, testifying to the independent nature of their research.

The Nobel for Medicine was shared by Mary E Brunkow, Fred Ramsdell, and Shimon Sakaguchi for their research on how the human immune system functions. Sakaguchi is an expert in immunology at Osaka University, Brunkow is a senior programme manager at the Institute for Systems Biology in Seattle, and Ramsdell is a co-founder of Sonoma Biotherapeutics, a biotechnology company based in San Francisco. Hungarian author Laszlo Krasznahorkai, a writer who belongs to a European literary tradition that extends through Kafka to Thomas Bernhard, and is characterized by absurdism and grotesque excess, received the Nobel for Literature. No Nobel award announcement has ever been unaccompanied by controversies, and the 2025 names had their share, albeit of a somewhat jocular nature. Despite having a plethora of big guns firing away for him, including Israeli Prime Minister Benjamin Netanyahu, Cambodian Prime Minister Hun Manet and the Pakistan government, US President Donald Trump, who had openly campaigned for the Peace prize, did not receive it! Apparently, the self-styled 'President of Peace' might have stood a slim chance of getting the Peace Nobel had his peace plan for the Middle East come a month or so earlier. However, according to the Nobel Awards Committee, Trump can be considered for the award next year provided his plan is implemented in toto and does lead to abiding peace in that region.

AT/12/6

A Loaning Curve

Lijee Philip

The pandemic, the pandemic was spreading, lockdown was underway and the once-busy streets of Nalgonda, a suburb in Medchal-Vasundhara taluk, were silent—much like the world at the time. What also stood silent in the town was Mahaveer Srinivasan's school, Our Lady of Victory, which used to be filled with the din of over 3,000 students. Kids dropped out, the corridors stopped and infrastructure upgrades were out of the question. Srinivasan remembers the sleepless nights: "We were packing. Online education needed mobile phones, laptops, a stable internet—most of our students couldn't afford that. We could barely build things together."

At that time, it was not a unique predicament as the pandemic hit many such affordable schools harder than their elite cousins. But five years on, Srinivasan's school has not just bounced back—its thriving. Thanks to a timely loan from Varthana, a Bengaluru-based non-lending financial company (NBFC) that gives financial assistance to schools, they built new classrooms, opened 850 and even converted a library to include extra-curricular learning spaces. He says, "We got our 3,000 students back—and no one's stronger than ever."

Sequential story (not an exception). Across the land, a slow but steady revolution is underway. They came since 2018 have been a new model of school growth—one that is geographically expansive, holistic, supported and increasingly tech-enabled.

AFRERUN

The pandemic's expansion in the world for many sectors, and schools were different. With physical closure and temporary halted, the education infrastructure expansion came to a halt. However, the demand for not only the best but also the most. R.V. Srinivasan, CEO of Profitus Capital, an NBFC with exposure to the school finance segment, says the growth today is exponential growth. "They want English medium education, holistic development and better outcomes—and they are willing to spend on it," he says. "We are seeing a shift from government to private schools, and even from state boards to CBSE or ICSE."

From Kollam to Kurnool, schools are upgrading, expanding and evolving. Large private school chains are venturing into new states, leasing existing school buildings to save time and effort. Recently, a prominent Telangana-based school chain entered Rajasthan, by taking over

After the Covid slump, affordable private schools in small towns are expanding and upgrading as lending institutions show a growing interest in the education sector

a dilapidated school building in a long-term lease. With the help of Varthana Finance, the property owner renovated the infrastructure and handed over the keys to the southern lender.

"It's a win-win for all," says Steve Hardgrave, vice chairman of Varthana Finance. "The property owner retains ownership and receives a steady lease income. The school chain expands into a new geography. And we, as lenders, are able to diversify our portfolio with capital support," says Hardgrave, an American citizen who is based in India since 2013.

Varthana, founded in 2013, has funded over 10,000 schools in urban and rural markets and many have grown from just a few hundred students to thousands, says Hardgrave.

"Some started with 200 students and now have more than 1,500," he says, adding that the biggest growth driver is the emerging middle class. Varthana mostly finances infrastructure—expansion of classrooms, construction of restrooms, labs, digital classrooms, etc. "What we don't finance is working capital," he says.

Given the fact that India has the world's largest school-going population—over 258 million children, according to an India Brand Equity Foundation (IBEF) report—schools are always in demand. The rising aspirations of India's middle class mean parents are demanding more from educational institutions. They want English medium instruction, digital learning tools and better infrastructure.

Until recently, getting a loan to build or expand a school wasn't easy. Schools operate as sole traders or trusts—not companies—making them unattractive to traditional lenders. But that's changing, with education-focused lenders giving loans at interest rates ranging from 12.5% to 25%, the rates vary depending on the size of the loan, whether it is secured or unsecured, and the risk profile of the school.

In Kollam, Udayshankar Chavan, founder of ICSE-run English Medium School, found a similar crisis to that of Srinivasan's in Nalgonda. During the pandemic, he saw the student strength dwindling. He says, "Now, we have doubled enrolment with children coming from 17 villages." What gave them a big upsurge? ICSE's loan from school funders, which helped Chavan add two floors to his building and even launch a junior college.

Get Schooled

14.9 lakh
No. of Schools in India

3.67 lakh
No. of Private Schools

3.36 lakh
No. of Private Unaided Schools

Share of Education Institutions Availing Finance

11.6% FY2024 (E) | 16.2% FY2025 (P)

₹28 trillion
Estimated revenue generated by private unaided schools with 250+ students in FY24-FY25

₹7 trillion
Projected spend on infra by educational institutions in FY24-FY25

₹13-13.5 trillion
Addressable market for education financing in FY24-FY25
Source: CIBIL



The rising aspirations of India's middle and lower-middle class mean parents are demanding more from educational institutions. They want English medium instruction, digital learning tools and better infrastructure

"Our kids are mostly first-generation English learners. Some have parents that don't speak English and, without support, we can't deliver high-quality," he says. Chavan says the transformation often small-town school wasn't just physical—it was emotional.

Affordable private schools (APS) fill a critical gap in the Indian education ecosystem—between elite private schools charging lakhs of rupees a year and government schools that are often under-resourced. They also form the bulk of the country's 1.67 lakh private schools, offering quality education without the high affordable price tag. APS—typically charging between ₹100 and ₹1,500 a month—serve more than 60 million children in India. These are schools started by local entrepreneurs, often run as family businesses or under trusts and societies.

"Spending on education has taken up 30-45% of a household's income," says Hardgrave. "Parents want the best quality with the best budget, and schools need to invest in infrastructure and working capital needs. The available credit for education financing—including loans for infrastructure and operations—is estimated to be ₹13-13.5 trillion between FY24 and FY25, according to CIBIL. Private unaided schools, especially those with more than 250 students, are expected to generate ₹28 trillion in revenues during the same period.

"These numbers are a call for action. And financial institutions are gearing up."

NBFCs like Varthana, Profitus Capital, Profitus and Citi Capital and banks like DCB Bank and IIFC First Bank are actively entering schools with tailored loan products. They have developed specialised underwriting models for schools to assess student retention, fees, fee stability and school management quality rather than just balance sheets. Srinivasan of Profitus says this is the beginning of a long-term trend. "Affordable schools charge up to ₹1,000 per month and lease with a 10-year term of stable revenue and low demand," he says.

The central government's New Education Policy (NEP) has already strengthened this shift by encouraging holistic learning and sports, and using technology integration in classrooms.

Praveen Kuttu, MD and CEO of DCB Bank, says schools that lost students and revenue during Covid are building back stronger. He says, "We are seeing increased loan demand for everything from contracting classrooms to buying school buses." DCB Bank's

Educational Institute Finance programme covers all bases. Kuttu says the sector is ripe for strategic expansion. "We have seen growing momentum, particularly in rural and semi-urban India," he says. "We aim to double our balance sheet every three years, and when that 10x return comes, it's the part of our strategy."

We are seeing increased demand for everything from contracting classrooms to buying school buses
—PRAVEEN KUTTU, MD & CEO, DCB Bank



LOANS & LESSONS

Still, industry veterans are proceeding cautiously. Srinivasan of Profitus says the boom time isn't over yet. He says, "Large-scale rapid expansion is unlikely. Many schools are only large schools. Capex will happen, but gradually."

Challenges remain in reaching small, hard-to-access schools. Most lenders prefer large institutions with strong track records. Meanwhile, direct-to-school NBFCs, intermediaries who connect potential customers with financial products, often face the duped-schooler problem required for educational disbursement. Hardgrave says, "DSAs are often not focused on this niche. We need more players willing to invest in the long run—smaller schools, rural areas, last-mile of ₹10-40 lakh."

Change is coming. The institutions that are willing to adapt and grow, support is now more accessible than ever—because the demand is clearly visible. Ramesh

Education is one of the few sectors where demand is tied directly to aspirations. It's no longer just about reading and writing. It's about preparing kids for a future
—RAMESH RIVER, former MD, Mahindra Finance, who is on the board of financial institutions



Iyer, former MD of Mahindra Finance, who is on the board of financial institutions, says, "Education is one of the few sectors where demand is tied directly to aspirations. It's no longer just about reading and writing. It's about preparing kids for a future—and schools need capital to deliver that."

With over 300,000 affordable private schools serving 90 million students, the sector is no longer just a niche. As India's economy and income rise, education is becoming top priority for families across income groups. Experts expect this quiet education boom—powered by banks, NBFCs, and visionary school founders—is only likely to grow. And that's the one interesting chapter.

Spending on education now takes up 30-45% of a household's income. Parents want the best quality with the best budget, and schools that deliver on this are seeing stable, evergreen enrolments
—STEVE HARDGRAVE, vice chairman, Varthana Finance



Why did MOFs pioneers win the chemistry Nobel?

How are metal-organic frameworks being put to use across different applications? Why are they significant?

Srinivasan Subramanian

The story so far

For centuries, chemistry's main concern was to craft ever more complex molecules but it soon became clear to scientists that they were all confined to their own boundaries. The Nobel Prize in Chemistry 2025 honours those scientists who expanded that horizon. Susumu Kitagawa, Richard Kubeck, and Omar Yaghi have been listed for developing metal-organic frameworks (MOFs), little molecular scaffolds with vast internal spaces where other atoms and molecules can move, react or stay.

What is an MOF?

MOFs are crystalline structures in which metal ions serve as nodes and organic molecules as connectors. The resulting structure can have enormous internal surface area – thousands of square metres per gram – and their pores can be customised to attract or hold specific molecules. By carefully choosing the building blocks, researchers can control the size and shape of the cavities and the chemical environment within. MOFs are thus among the most versatile materials ever created.

What did Kitagawa and Kitagawa achieve?

In the 1970s, Richard Kubeck at the University of Melbourne was preparing ball-and-stick models in glass models have some context. He realised that the positions of the balls drilled into each atom contained all the information needed to determine the molecule's shape. If that logic worked for small molecules, he realised it could be scaled up.

An MOF called CALF-3D can efficiently capture carbon dioxide from factory exhaust and is already being tested in industrial plants

A decade later, Kitagawa combined copper ions, which like he found in a tetrahedral arrangement, with an organic molecule bearing four amine ending in nitrate groups. To

everyone's surprise, instead of a messy tangle, the components self-assembled into a diamond-like crystal. This lattice wasn't dense like a diamond but full of empty cavities, each capable of holding other molecules. Kitagawa predicted that such "frameworks" could be tailored to trap ions, catalyse reactions, and sieve molecules by size.

However, Kubeck's early crystals were fragile. Susumu Kitagawa in Japan made them stable and functional. Guided by his philosophy of finding "architects in the unseen", Kitagawa pursued porous materials even when they seemed too delicate to matter. In 1997, he used robust, nickel or zinc ions linked by a bridging molecule called 4,4'-bipyridine to build a true three-dimensional MOF. When the material was dried and refilled, gases such as methane, nitrogen, and oxygen could flow in and out without damaging the structure.

Kitagawa also recognised that MOFs could be soft rather than rigid, with flexible molecular joints allowing them to expand, contract or bend around depending on temperature, pressure, and the molecules inside.

What was Yaghi's contribution?

Omar Yaghi in the U.S. gave MOFs their structural strength and reproducibility. Having grown up in modest circumstances in Jordan, Yaghi was fascinated by chemistry's ability to create new kinds of order. At Arizona State University in the 1990s, he sought a way to build extended materials by design, not by chance, using metal ions as joints and organic molecules as struts. In 1998, he made the first two-dimensional framework linked by cubate or copper ions that could host other molecules without collapsing. Four years later, he achieved a landmark with MOF-5, a robust three-dimensional lattice made from zinc ions and benzene-tricarboxylate linkers. MOF-5 was strong and, remarkably, just a few grams had an internal surface area comparable to a football field. It was also the first MOF tested at 300°C and composed of all "pure" molecules.

By the early 2000s, his team had built entire families of MOFs with the same underlying geometry but different pore sizes and functions.

Why are MOFs important?

Chemists can easily make use of them for different applications. An MOF called CALF-3D can efficiently capture carbon dioxide from factory exhaust and is already being tested in industrial plants. MOF-303 can harvest drinking water from arid desert air by absorbing vapour at night and releasing it in daylight. UO-67 can remove persistent liver cancer chemicals (PHE) from water. MOF-303 and ZIF-4 can speed up the breakdown of pollutants and recover rare earth metals from wastewater.

In the energy sector, MOF-901 and MOF-67 can store hydrogen or methane safely at moderate pressure, a crucial step toward clean-fuel vehicles. Others serve as containers for toxic gases in semiconductor manufacturing and as drug-delivery capsules that release medicines in response to biological cues.

A CHILLING STERILITY

Literature is a landscape that mirrors reality. It is not surprising then that a new study published in *Earth* has found that people's connection to nature has declined by more than 60% since 1800, mirroring the disappearance of words referring to the natural world, such as 'river', 'moss' and 'blossom', from books in English around that time. The study goes on to show that the words used in English-language books written in the last 200 years reflect life, which, since the Industrial Revolution, has moved indoors. The fall in literary references to 'meadow' thus corresponds to the rise of 'factory', the shrinking of 'river' echoes the growth of 'cities' — linguistically and literally. This erosion of the natural in English language is borne out by other examples. The *Oxford Junior Dictionary*, for instance, removed words like 'acorn', 'kingfisher', and 'willow' in favour of 'broadband' and 'chatroom' recently. When a language loses its words for the living world, it is not just the lexicon that shrinks; imagination does too. For instance, psychologists at the London Business School found that without the word, meadow, a child cannot easily picture its soft, green expanse; without the word, bough, the branch becomes just a stick.

For centuries, English literature served as a record of ecological intimacy. William Shakespeare used the natural world to capture human emotion — a tempest could stand for rage, a summer's day for love, a wilting rose for mortality. Wordsworth went further, trusting the natural world more than human institutions. "Come forth into the light of things," he urged, "Let Nature be your teacher." Thomas

Hardy, writing much later, caught the moment when that world began to collapse. His Dorset landscapes throb with rivers and heaths, but modernity had already begun to gnaw at their edges. His novels hold the ache of that transition — the sense of a people losing not only their land but the words that named it.

One of the cultural responses to such a loss has, in recent times, been the rise of 'cli-fi' — climate fiction that imagines the apocalyptic outcome of the loss of nature. From Cormac McCarthy's *The Road* to Sarah Hall's *The Carhullan Army* to Amitav Ghosh's non-fiction writing, writers are increasingly chronicling

landscapes of desolation and warning. This is a depiction of sterility that is also eroding language and literature which are, in turn, losing words associated with nature.

The next frontier should perhaps be desire, not dystopia. What literature needs now is not only climate fiction but nature fiction — stories where the natural world is portrayed as

something to crave, protect, and celebrate. Books where rivers still sing and forests are characters, not casualties. Writers such as Richard Powers (*The Overstory*) and Barbara Kingsolver (*Flight Behaviour*) have shown that ecological storytelling can move readers as deeply, that trees, bees, and the wind are not just metaphors but kin. This rewilding of language may be as vital as the rewilding of land. Can the revival of nature in word be matched by deed? That is not certain. But without it, no policy or technology will matter because to protect something, one must first remember its name.

A recent study shows that words related to the natural world are disappearing from English-language books. Could it be that language needs rewilding too?



Discuss SC idea of sex education

The Supreme Court's observation that authorities should consider making children aware of "changes that happen after puberty" by incorporating sex education in school syllabus from lower classes merits a wider discussion in society. The intent behind the court's suggestion is that such education would enable teenagers to guard themselves against unwarranted advances by others is laudable and must be welcomed.

In the modern era, teenagers have access to every sort of information, including that of erotic nature, either on their smartphones or OTT platforms — even movies rated for family viewership are also replete with double-meaning erotic references. Unlike the past, censorship of content is near impossible, and parents — busy in making their careers — find no time to guide children.

Influenced by the open culture, reports of underage sex — either by consent or deception — and rape are also gradually increasing in society. Unaware teenagers become easy targets for paedophiles, who are on the prowl. In this background, the Supreme Court's suggestion appears plausible.

Nevertheless, as the subject is a sensitive topic concerning children's future, it requires wider consultation in society. Teenage is the most crucial time when children's future is set, as it is this age when they take all crucial examinations that could shape their careers.

Unlike in Western countries, the predominant majority of Indians consider marriage to be a sacrament. As such, the State should not give the impression it encourages underage sex. While reports of underage sex are on the rise, the State's actions should not fan the flame. Similarly, the family continues to remain a strong foundation of Indian society, and casual sex should not be allowed to undermine it.

If officials decide to consider the Supreme Court's observations, they need to conduct an in-depth study on the pros and cons of the probable impact of opening up sex education to children at an early age. M/S

TU stalemate

The stalemate at Tezpur University (TU) continues, with a string of protests by students and heads and deans of most of the departments for the past several days against alleged financial and administrative mismanagement by the Vice Chancellor. Curiously, the protests had initially begun with the students taking a strong exception to the VC's "brazen indifference" towards a homage-paying ceremony for departed singing icon Zubeen Garg on September 21. Emotions have run high since and an apology on the part of the VC failed to pacify the agitators, who were later joined by the teachers and staff. All this has paralysed the varsity for over two weeks, which is far from a healthy development. The academic environment and campus discipline have gone for a toss and all this bodes ill for the future. The agitators should see reason and refrain from vitiating the academic environment any further so that normalcy is restored in the campus. An inquiry committee has already been formed by the Assam Governor, who is the Chancellor of the varsity, and this should calm down agitated minds. Whatever might be the grievances of the students, the sanctified campus of a university cannot be allowed to degenerate into a chaotic protesting arena for weeks. There are proper ways and means to get the grievances addressed, and holding the varsity's dignity to ransom cannot be acceptable.

The government, which apparently failed to initiate timely action to ease matters, should ensure that a high-level probe unearths financial and administrative irregularities and fixes responsibility for those. The protesters can continue with their demands in a measured way without disrupting normal activities, especially academic, on the campus if they feel that the authorities are taking matters lightly. Protests should focus on getting an impartial inquiry rather than indulging in personal vilification. As is being alleged, not everything is running smoothly in the varsity, with there being many areas of concern. Enhancing academic performances and facilitating world-class research and innovation, creating better placement opportunities for students, better remuneration for research scholars, filling up of vacant posts, improved hostel facilities, etc., ought to be the common goal of the students and teachers. If anything, including vested interests of a person or a coterie of persons, is found to be throttling the wellbeing of the varsity, those should definitely be pointed out, discussed, and probed. The university authorities, too, must function transparently and with accountability – and certainly not by stifling legitimate dissatisfaction of students, teachers and staff, and riding roughshod over the institution's lofty ideals.

AT/UTU

Sailesh Sahadevan
Deepak John Mathew

Can a plant remember? Can a forest converse? Experiments show that pea plants learn to associate the breeze of a fan with light and grow accordingly. If intelligence means sensing and adjusting to a context, then, even the simplest life forms qualify. Intelligence is not limited to a few. In its quiet way, a pea plant shows predictive intelligence.

Biologists have recorded slime molds solving mazes without neurons and trees exchanging signals through fungal networks. None of these systems has a brain, yet they show signs of cognition. Some scientists resist calling it intelligence, while others believe the term needs expanding. Either way, this debate pushes our understanding of what intelligence is and where it resides.

Beyond humans

It turns out that intelligence is not confined to the brain, or to humans. We are not the only problem-solving species. Being human is a competitive advantage. Cognitive science shows learning spans tools, bodies, contexts, and relationships. Intelligence is not confined to the brain. We need a post-human view of intelligence that is distributed, ecological, and shared. Yet, classrooms still treat learners as isolated processors assessed for recall, speed, and output. This model of intelligence is misleading, assuming higher grades equal higher intelligence.

In the 1980s, Gardner widened the lens to include linguistic, bodily, interpersonal,

A question of intelligence

How do we promote the many modes of intelligence already in play, not just co-intelligence with AI?



and other intelligences. Critics say the scheme confuses talents with intelligence and lacks solid psychometric footing. But the debate reminds us that IQ, EQ, or what Gardner said are only partial maps of reality.

When AI intrudes into all learning, we must stop over-rewarding codified knowledge. Learners who adapt to uncertainty or pick up on subtle cues may go unnoticed. Their intelligence is real but illegible to traditional assessment. If intelligence is adapting to complexity, how different would classroom practice be?

Intelligence is not something we have but something that happens between organisms, environments, and interactions. It is relational. So, the educational question becomes: how well does this learner go through the world rather than how smart are they?

Unboxing the brain

If intelligence is adaptation, we might reward learners who ask better questions over those with quick answers. We would allow real-world complexity in our learning environments and would move away from tidy problems with clear-cut answers. Students would learn to handle ambiguous information, partial data, and shifting conditions. The goal would not be to land on the 'right' solution, but to interpret outcomes and test ideas as they go. Assessment would shift from timed tests to tracking how learners adjust their thinking with new variables. Instead of 'what did you get?', we will ask, 'what did you revise?' Or 'what changed in your thinking, and why?'

In complex systems, an er-

ror is information and a signal. Students can trace missteps and identify what is not working. Learning moves from performance to calibration to know how learners refine their fit with problems over time. Rather than controlling knowledge flow, teachers will spot patterns and build contexts for learning, helping students create tolerance for confusion and discomfort. They are two companions of real insight in a fragile world that we are not prepared for. You would not just ask what a student knows, but what kind of system their knowledge enables when it connects with others. This will lead to a sort of collaborative intelligence.

If bacteria and trees exhibit intelligent behaviour, then intelligence is basic. Learning has to bring up something beyond the basics. We must ask: How do we promote the many modes of intelligence already in play, not just co-intelligence with AI? This would broaden what counts as learning success. This is demanding, and expects learners to think with their whole system and also requires institutions to support less measurable, harder-to-standardise learning engagements.

But, it can make humans exceptional. We can notice a stranger crying, feel our chest tighten, and step in, even when no one watches or nothing is gained. If our natural intelligence runs that deep, being human is a competitive advantage in the age of AI.

Views are personal

Sailesh Sahadevan is Deputy Secretary with the University Grants Commission. Prof. Deepak John Mathew is the founding head of Department of Design at IIT Hyderabad.

Career prospects in agriculture, allied sectors

DR RATNA KINKOR GOSWAMI

Diverse job opportunities in these sectors can be unlocked through research, innovation, and entrepreneurship, driving sustainable growth.

The Indian economy is heavily dependent on agriculture and allied sectors, which together contribute about 18% of India's Gross Value Added (GVA) and employ the largest (48%) share of the Indian workforce. The increasing population has enhanced the demand for quality, safe and nutritious food. To meet this demand, there has been a quantum shift in Indian agriculture from traditional farming to more efficient, sustainable and highly productive practices, creating vibrant job opportunities in the field of agriculture.

The nature of work in agriculture and the allied sectors is very dynamic, feasible, rewarding and engaging, with satisfactory salaries or earnings. Choosing a purposeful career in agriculture opens up numerous opportunities for an agriculturist. Working in the field of agriculture and allied sectors in groups is always exciting, enjoyable and full of adventure, breaking the monotony of human life and helping maintain good health.

Job avenues

There are plenty of job opportunities in various Central and State agricultural departments for agricultural graduates to join as Agriculture Development Officers (ADOs), Horticulture Development Officers, Soil Conservation Officers, and vocational teachers in government schools, as well as in the Departments of Horticulture and Soil and Water Conservation in some States.

One may choose a career under the ICAR (Indian Council of Agricultural Research) in areas of research and become an Agricultural Research Scientist (ARS). A

bachelor's degree holder in agriculture can apply for some technical posts in ICAR institutes. After completion of a master's or PhD, one may opt for the post of Professor, Scientist or Extension Specialist in State Agricultural Universities (SAUs) and as Subject Matter Specialist (SMS) in Krishi Vigyan Kendras (KVKs). Postgraduate students may also work as Research Associates or Senior Research Fellows in ICAR-funded research schemes.

Agriculture graduates are also eligible to apply for Indian or State Civil Services (IAS, IPS, ACS, APS and Allied Services) examinations conducted by the Union Public Service Commission and the State Public Service Commissions.

A number of nationalised and private sector banks offer openings for agriculture and allied science graduates as Field Officers, Rural Development Officers, Agricultural Officers and Probationary Officers.

Job opportunities also exist in seed companies as Seed Officers, Scientists, Technical Officers, and in farm and tea garden management, land appraisal, agricultural grading, packaging and labelling. The agro industry provides jobs for scientists, sales and marketing professionals, production experts, and those in food processing, seed processing, machinery and equipment, fertilisers, pesticides, herbicides, etc.

Government sector

Agriculture graduates and postgraduates may start their careers in various agencies under State or Central Government, such as MARKFED, PUNSUP, and the Mandi Board. Various corporations and agencies such as the National Seed Corporation,

Warehousing Corporation, Food Corporation of India, and agricultural food processing and export-related agencies also provide job openings to agriculturists. In addition, after postgraduation, one may get placement as a plant quarantine officer, agricultural technician, consultant or statistician, and help implement regulations for food, feed, seed and fertilisers.

At the international level, the Food and Agriculture Organization (FAO) of the United Nations, ICRISAT, ILRI and some other agencies related to agricultural development also appoint consultants.

Private sector

Agro-based industries such as those producing seeds, fertilisers, pesticides and sugar, and sectors such as marketing and warehousing, are potential fields in which a large number of agricultural graduates and postgraduates can find employment. Besides, several retail markets such as Reliance Fresh, Aditya Birla Group, Walmart, ITC, Nilgiris, Pantaloon, Q Shops and Food Bazaar are expanding their businesses, thereby creating more job opportunities for agriculture graduates.

Entrepreneurship

Agriculture graduates can become successful entrepreneurs too. There are a number of success stories of agri-entrepreneurs in the fields of agriculture and horticulture. The Student READY programme introduced by ICAR in the undergraduate curriculum motivates them to seek self-employment and become entrepreneurs. This eventually helps them turn into job providers rather than job seekers.

Start-ups and Stand-ups

The Union Ministry of Agriculture, in association with NABARD, has launched a unique programme to provide better farming methods to every farmer across the country. This programme aims to tap the expertise available in the large pool of agriculture graduates. One can set up one's own agri-clinic or agri-business centre and offer professional extension services to innumerable farmers. MANAGE, Hyderabad, organises free training programmes for students for a period of three months. Upon completion, students receive a certificate, which is required to qualify for a loan funded by NABARD. This financial support helps graduates establish their agri-based businesses.

Government schemes

With the initiation of government schemes like Aatmanirbhar Bharat, Make in India, Pradhan Mantri Kisan Sinchai Yojana, and the Crop Insurance Scheme, along with growing private sector investment, the overall scenario of agriculture as an industry has undergone a significant change in the past decade. All these government schemes aim to increase agricultural production and productivity to improve the income of the farming community.

The agricultural sector is projected to grow at a tremendous rate in the coming days. More and more people are choosing agriculture as a preferred employment sector. It offers job security of a kind rarely found in other government or private sectors.

(The author is Professor and HoD, Crop Physiology, Baranath College of Agriculture)

8/10/21

CURSOR ▶ Eco Nobel celebrates innovation-led growth powered by S&T, skills and openness

An Adventure of Ruptures



T K Arun

The 2025 Nobel Prize for Economics has gone to three economists — two of them based in the US, although neither is US-born, and the third, in France — 'for having explained innovation-driven economic growth'. Joel Mokyr, born in the Netherlands, and working at Northwestern, Illinois, has been honoured for 'for having identified the prerequisites for sustained growth through technological progress'. Philippe Aghion, a Parisian by birth, education and work, and Peter Howitt, a Canadian by birth, who works at Brown University Rhode Island, the US, have been awarded 'for the theory of sustained growth through creative destruction'.

The award is also a nod to Robert Solow, winner of the Nobel prize in 1987, who had identified technological progress as accounting for a major part of economic growth in the US, rather than mere deployment of more capital, to Joseph Schumpeter, who popularised the term creative destruction, and to Karl Marx, who waxed eloquent on the capacity of capitalism to constantly revolutionise production, destroying prior production methods and associated social relations.

These awardees show that the key ingredients producing sustained growth are a joint evolution of science and technology, mechanical competence and social acceptance of creative

destruction. All through human history there have been scientific and technological breakthroughs. But before the Industrial Revolution, the two did not go hand in hand.

Mokyr distinguished between what he called propositional knowledge and prescriptive knowledge. These terms can broadly be understood as science/theory and technology/application but are a little different. Propositional knowledge involves observing and classifying natural phenomena and understanding regularities and principles underlying natural laws governing the observed phenomena, complete with mathematics needed for the purpose. Prescriptive knowledge is the art, skills and craft for making things.

Before Louis Pasteur brought home the idea of germs, surgeons who noticed that washing their hands before operating on patients brought down the incidence of infection.



Mokyr (from left), Howitt and Aghion show that the key ingredients producing sustained growth are a joint evolution of S&T, mechanical competence and social acceptance of creative destruction

and tried to persuade other doctors to do the same were laughed out of court. The prescriptive knowledge was not backed up by the propositional knowledge about what caused infections. When the two combine, things change, dramatically.



Rapture with disruption

But for such marriage between the two kinds of knowledge to become routine, society must be geared for it. One, it must be culturally prepared to accept the disruption of tradition wrought by scientific advance. Galileo was famously forced to recant the notion that the earth moved around the sun by the Catholic Church.

Two, for prescriptive knowledge backed by propositional knowledge to permeate production, enough members of society must have the mental aptitude and physical skills needed to work on technology. Mokyr and collaborators measured the population density of people with practical skills like those of blacksmith and correlated it with industrial innovation in England. It is not enough for people to be literate and numerate.

Aghion and Howitt developed a mathematical model, in which they were able to link innovation, growth, job creation, job destruction, funds for

R&D, interest rates and savings. This led to subsequent research that elucidated the process of creative destruction driving economic growth.

The choice for this year's Nobel Prize is an indirect rebuff to Donald Trump's budget cuts for scientific research and attacks on universities and immigrant talent. It brings out the stark stupidity of magical thinking about the existence of advanced tech in the hoary past, as it lays emphasis on the kind of social structure that allows scientific and technological advances to take place, and convert into economic advance.

By stressing the importance of skills, rather than merely of abstract knowledge, and the importance of social mobility not just across human generations but also across generations of tech, the laureates' finding is an indirect, implicit critique of the caste system and rigid social hierarchy.

This year's Nobel laureates stress the importance of generalised dispersion of the ability to tinker with products and machines, to get dirty with hands on applications of scientific insights to practical work and production. In India's traditional thinking, only those who focus on abstract ideas deserve respect. Even now, the bulk of our engineering graduates prefer to write computer code than to take up any engineering job that requires getting grease or calluses on their hands.

Because the societal benefit from continuous innovation is greater than the benefit to companies that innovate but could see their gains from innovation being wiped out by other innovating companies and their superior products or superior efficiency in production, there is a case for subsidising R&D. This insight puts paid to the notion that the free market, left to itself, would act like a dynamo of innovation and creativity, and that industrial policy is undesirable. Another policy insight is that workers, rather than jobs, need to be protected.

Like the awards for medicine, physics and chemistry, the Economics Nobel this year celebrates ideas with direct, practical applications.

etp

THREE INNOVATORS

Economics Nobel is a nod to the idea that progress needs constant cultivation of innovative mechanisms

DOES INNOVATION IPSO facto spur economic growth, and does that, in turn, raise living standards? It's often tempting to answer in the affirmative. History, however, shows that the links between the three are not straightforward. At a moment when the world is on the cusp of a tech revolution that could upend conventional notions of labour and creativity, raising optimism and creating disruption, the Nobel Committee has honoured three economists who have shone a light on why innovations enhance human well-being. Together, the work of Joel Mokyr at Northwestern University in the US, Philippe Aghion at the London School of Economics and Peter Howitt of Brown University explains why the world began growing at an unprecedented pace over the last two centuries, how societies sustained growth, and what happens when innovation is stifled.

Mokyr, an economic historian, was awarded half of the prize "for having identified the prerequisites for sustained growth through technological progress". Innovation has been a longstanding feature of human societies, but it became a driver of economic growth only after the Industrial Revolution. As his work shows, technology becomes a harbinger of social prosperity only when there are scientific explanations for how things work. How to sustain that creative impulse? Aghion and Howitt use a mathematical model to explain what they call "creative destruction" — when a new and better product enters the market, companies selling older products lose out. The innovation represents something new and is thus creative. However, it also outcompetes an existing product, and is destructive.

The three laureates show the importance of managing the turbulence that usually follows far-reaching technological changes. Aghion has been a critic of protectionism, and Mokyr emphasised the importance of society being open to new ideas. Their work carries another message — progress is not guaranteed and requires nurturing innovative mechanisms.

12/10

Beyond textbooks: How newage media is helping build skills in the 21st century

POOJAN KUMAR/NEWSRATNA

By 2050, nearly 80 percent of the jobs that today's learners will be doing have not even been invented yet, according to the World Economic Forum. In such an unpredictable future, textbooks alone fall short in preparing young minds. Enter newage media—interactive apps, online platforms, podcasts, and virtual classrooms—that not just supplement education but revolutionizing it. By fostering creativity, digital literacy, and critical thinking, these tools are equipping students with the very skills that will define success in the 21st century.

For decades, education has been largely confined to textbooks and examinations. While they provided knowledge, they rarely encouraged innovation or problem-solving. The 21st-century learner demands learners who can adapt quickly, think critically, and collaborate across cultures. Skills, not rote memorisation, are the new currency of growth.

From YouTube lectures to TED Talks, from coding apps to gamified quizzes, digital media has become a global classroom accessible at the click of a button. Virtual and Augmented Reality allow students to conduct science experiments, tour historical sites, or even simulate business models—experiences a textbook alone could never provide. Podcasts and online discussion forums, meanwhile, create opportunities for students to engage with diverse perspectives, building communication and empathy.

Newage media is shaping what experts call the '5Cs of 21st-century skills'—Critical thinking, Creativity, Communication, and Collaboration.

Critical thinking: Online debates, case studies, and problem-solving games sharpen analytical skills.

Creativity: Several platforms allow learners to design, create, and innovate.

Communication: Digital storytelling, podcasting, and video creation help students express ideas clearly.

Collaboration: Several tools and global



student networks foster teamwork beyond borders.

In addition, digital literacy—the ability to discern, create, and evaluate content online—is emerging as a survival skill in itself.

Traditional classrooms are being reimagined into hybrid models where technology and textbooks complement each other. Teachers are evolving into facilitators who guide students in navigating digital platforms rather than being the sole source of knowledge. For instance, in a flipped classroom model, students watch a concept video at home and then apply the knowledge through group projects in school. Such approaches ensure that learning is active, engaging, and skill-based. They also foster teamwork, encourage open dialogues and strengthen students' ability to work effectively in groups. These interactive experiences transform classrooms into dynamic spaces of exploration, creativity, and multifaceted growth.

One of the biggest advantages of new age media is its ability to extend learning beyond school gates. Students can take self-paced courses through MOOCs (Massive Open Online Courses), participate in coding boot camps, or even learn life skills like cooking, financial planning, or photography from global experts online. Learning is no longer bound by age, subject, or geography—it has become lifelong and borderless.

To unlock the full potential of new age media, many educational institutions are also integrating media literacy into their core curriculum, allowing learners to utilise digital platforms responsibly.

In addition, it is playing a vital role in promoting inclusive education with tools like voice-to-text and customisable interfaces that allow differently abled individuals to access content more effectively. These technologies are not only accommodating diverse learning requirements but also breaking dependence and confidence among students who may otherwise face challenges in traditional learning environments.

The challenges we must address. However, this shift is not without challenges. The digital divide remains a pressing concern, with many students still lacking access to reliable internet or devices. Excessive screen time can also affect health and social interaction. Moreover, the flood of information online raises questions about the quality, credibility, and ethics of content. Balancing traditional methods with new-age tools is crucial to avoid overdependence on technology.

Educators must also address the challenge of retaining student engagement in virtual environments, where significant distractions impact focus and attention. Moreover, not all educators are equipped to embrace digital tools effectively, underlining the imperative need for continuous training and support. Ensuring equitable access, digital literacy, and pedagogical readiness are vital to make this transformation truly effective.

The road ahead

The future of education lies in integration, not replacement. Textbooks will continue to play a role, but their dominance will gradually give way to hybrid models powered by digital tools. Policymakers and schools must invest in teacher training, digital infrastructure, and inclusive practices to ensure that no learner is left behind. Most importantly, students must be encouraged to see learning not as a temporary phase but as a lifelong journey. This transformation will offer a change in mindset, where curiosity, adaptability, and self-driven exploration take center stage in the learning process.

Educational institutions must lay emphasis on creating environments that support continuous upskilling, multidisciplinary thinking, and emotional intelligence. By embracing legacy wisdom with technological innovation, education delivery will evolve into a more personalised and future-ready experience.

Eco Nobel & CreAItive Destruction

The three laureates did their work pre-AI. But their research showed how important rules are for humanity to gain from massive tech disruption. But is the madness of this tech without a method?

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Diverse geography, turbulent history, and disparate cultures separated them. But somewhere along the way, an unstated, sometimes less appreciated, element overlapped between the two great stories. The Protestant ethics of thrift, hard work, and disciplines may have laid the Western foundations of capitalism. Almost a century later, when Asia rose to claim its place under the sun, the plinth was built on Confucian values. Yet, the link between the two, often taken for granted by most, except by economists, was the formidable power of technology.

It came as a reminder on Monday when the Royal Swedish Academy of Sciences announced the winners of the 2025 Nobel economics prize. The award went to Joel Mokyr, Philippe Aghion, and Peter Howitt for "having explained innovation-driven economic growth".

Mokyr was honoured "for having identified the prerequisites for sustained growth through technological progress", while Aghion and Peter Howitt were awarded for the "theory of sustained growth through creative destruction". Creative destruction of course is a term coined by Joseph Schumpeter, the Austrian economist who was the most complex, yet charismatic, figure in the history of the dismal science.

No one would, however, miss the timing. While Aghion and Howitt's original article dates back to 1992 and Mokyr's seminal work was published in 1998, their Nobel arrives at a moment when 'artificial intelligence' has pushed the frontiers of technology to a realm of unknown-unknown.

The Academy skirted the huge body of work on trade and tariffs – a volatile subject when liberalisation, hounded by politics, is on retreat – to alert, even warn, about the impact of a new force that a world, settled into the grooves of internet and leaps in computing power, is today waking up to.

The trio isn't the first to explore the coupling of technology and growth. In 2004, Finn E Kydland and Edward C Prescott won the Nobel for their work on connecting the oscillations in technology and short-term business cycles – how economies react to shocks and spurts in productivity.

Two decades later, such shocks have acquired a hitherto unknown scale, tempting to change the rules

of the game with a scary clinical efficiency – from warfare to espionage, from shop-floor dynamics to education, from healthcare to romance; replacing not just tedious manufacturing labour, but even programmers with white coders.

But, like schools of historians, who over the ages have differed on the role of individuals, vis-à-vis the structural forces in shaping societies and lives, Aghion-Howitt-Mokyr treaded a road different from their enigmatic forebear.

Schumpeter was fascinated by the part played by the

will spring organically from commitments to research and development, where institutional finance will back and promote them, patents would ringfence them, and regulations would govern them.

But in some ways their beliefs are a harbinger of the almost forgotten trust once placed by one of the greatest minds of 19th century, John Stuart Mill, on the forces of political economy. Unlike Marx – the enfant terrible of economics who published *Manifesto* in the same year as Mill's *Principles* to predict a classless society – Mill was confident that capitalism would evolve and preserve liberties of individuals in their pursuit of wealth.

Mill's controversial challenger in the aftermath of the industrial revolution may have lost a lot of his relevance in popular imagination, but nonetheless he may still continue to remind the world that the clash of technology and humans is rarely a plot that plays out in predictable ways.

Today anyone, actors in almost every walk of life, from students and consultants to technocrats and industrialists, would refrain from betting that AI, by far the most potent technology, with all its pitfalls and threats of future conquests, would unfold systematically. Indeed, the madness may lack a method.

But, herein lies the gem wrapped in the thinking of today's Nobel winners – and perhaps a script to rein in unsettling madness. If ideas spring from institutions and societies, if the businessman has the luxury to pick and choose the technology for society to witness a "vertical progress", rules become paramount for humanity to gain. The work of Aghion-Howitt-Mokyr is an attempt to lend a structure to Schumpeter's broad sweeping style of the 1940s while simultaneously differing with it. It was certainly not inspired by the disruptive nature of today's AI. But it may offer hints for navigating the path that lies ahead.

Schumpeter had famously said, "I wanted to be the greatest economist in the world, the greatest horseman in Austria, and the best lover in Vienna. Well, I never became the greatest horseman in Austria." Two of his fond dreams turned true. Close to a century later, economists today are grappling for answers to ever-changing questions while technology threatens to redefine 'love' by altering the boundaries of attachments. The Austrian thinker, with his flair for drama, may have the last laugh.



cast of entrepreneurs in different eras, the bursts of exotic innovations coming in unexpected intervals, throwing up new products and leaving a trail of destruction in the form of closed factories and obsolete goods and withering away of fleeting profits of once-redoubtable monopolies.

While Mokyr explored the historical genesis of creative destruction, Aghion and Howitt strived to decipher its mechanism with a mathematical model. The Nobel winners of 2025 have, however, reposed their faith in an orderly progress of technology where ideas

25/10

इस प्रतिष्ठित पुरस्कार का वैश्विक खेमेबंदियों और दबावों से ऊपर रहना जरूरी

थोड़ा घटा सा लगता है नोबेल का स्तर

स्वीडन तकनीकी तौर पर पैदो का सदस्य पिछली नोबेल घोषणा से कुछ महीने पहले ही बन गया था, लेकिन इस महात्वापूर्ण नैतिगत बदलाव से जुड़े आर्थिक और कूटनीतिक दबावों की आशंका पिछले साल उतनी ज्यादा नहीं थी। वैसे भी, 2024 के नोबेल पुरस्कार

इसके समूचे इतिहास में खाकी सारीय माने गए थे। अमेरिकी दबाव में स्वीडन का डिफेंस बजट बढ़ने के साथ नोबेल स्वीडनिंग का खर्चा और साथ में पुरस्कारों का स्तर भी नीचे जाने का डर इस बार कहीं ज्यादा था, और यह अंदाजा कुछ हद तक सही साबित हुआ। 2025 में पोपिता ज्यादातर नोबेल पुरस्कारों में वैसी कोई चमक नहीं है, जिसे चौककर देखा जाए और आने वाले समय पर विस्मय बड़ा प्रभाव मतभ्रम सिखा जाए। **अवॉर्ड न मिलने की चर्चा**। शांति के क्षेत्र में दिए गए नोबेल पुरस्कार पर बात करें तो इसमें एक धुंधली चमक का तब शक्ति था। सबसे बड़ा कयाल यह कि किसी को यह प्राप्ति मिलने पर जितनी बातें हुईं, उससे कहीं ज्यादा बातें किसी को इसके न मिलने पर हुईं। अमेरिकी राष्ट्रपति डॉनल्ड ट्रंप कम से कम छह महीने से खुद ही 'प्रेस

अवॉर्ड पर क्या थे विवाद

- अमेरिकी राष्ट्रपति के जवाब से उठा था संदेश
- शांति पुरस्कार पर फिर भी रहा US का साथ
- विषमता के बजाय संपत्ति सृजन पर रहा जोर



नोबेल' के सबसे बड़े दावेदार बने हुए थे। पूरी सात लड़ाइयां रुकवा देने का उनका दावा था और पाकिस्तान, इराक़ तथा कंबोडिया के प्रधानमंत्रियों ने उनकी अनुशंसा कर रखी थी। सो, अपने ही एक खास के पास इसका चले जान उन्हीं अखंड ले नहीं लगा होगा। **संपदा सृजन पर जोर**। अर्थशास्त्र का नोबेल कहलाने वाला पुरस्कार पिछले दो-तीन वर्षों से विषमता के चर्चित अर्थशास्त्री टॉमस पेकिटी और इसी विवाज के एक अर्थशास्त्री मैकिल जूकमान को मिलने की बात कही जा रही है। लेकिन



अर्थशास्त्र दुनिया की मुख्यधारा निर्धारित करने वाला शस्त्र है और नोबेल चयन समिति की कोशिश मुख्यधारा का विनाश दिखाने की होती है। इस बार पुरस्कृत अर्थशास्त्री तीन अलग-अलग क्षेत्रों से जुड़े हैं और उनका काम संपदा के वितरण से नहीं, उसके सृजन से जुड़ा है। **इस बार भी यश**। रही बात साहित्य की तो इसमें गद्य को पुरस्कृत करने का सिलसिला इस बार भी जारी रहा, लेकिन हान कांग, योन फुसे और अब्दुल रबाक मुर्ता के तकलीफ से बरे यथार्थवाद की तुलना में 2025 की साहित्यिक चयन समिति ने ठेठ फैंटसी को नोबेल से



मनोरंजन उपलब्ध करने वाले किसी कथोदात्मक को नहीं, गहरी बेवैनी को रेखांकित करने वाले फैंटसी लेखक लेस्लो क्रॉसहेनोफोर्ड को ही मिला है। ये बाबू के साथ बड़े प्रयोग करने वाले लेखक हैं, लेकिन उनकी विधा ऐसी है, जिसमें दुनिया की दोस शक्तें जल देर में नजर आते हैं। **मचाछो का दम**। शांति का नोबेल पाने वाली वेनेजुएला की मुख्य विपक्ष नेता मारिया कोरिजे मचाछो की छपति विपरीत परिस्थितियों में डूटी रहने वाली राजनेता की रही है। हालांकि इस दक्षिण अमेरिकी देश के शीर्ष नेतृत्व के समय से अमेरिका के निशाने पर है। लेकिन कुछ समय पहले वेनेजुएला में हुए आम चुनावों के नतीजे पर क्यूबा और चीन की जैसे घोर अमेरिका विरोधी देशों ने भी हामी नहीं

भरी है। यानी मचाछो को ओर से लड़ाई जा रही चुनावी धंधलों की बात में दम है। **भौतिकी नोबेल की विशिष्टता**। यहां विज्ञान के तीनों पुरस्कारों के क्षेत्र के बारे में भी थोड़ी बात कर ली जाए। भौतिकी में यह बड़ा महीने के बजाय छोटे उपकरणों में क्वांटम मैकेनिकल टेलिंग और क्वांटम एनर्जी सफ़्ट के विकास में बुनियादी काम के लिए दिया गया है। क्वांटम कंप्यूटर और क्वांटम सेसर से जुड़े क्षेत्रों में इस काम के जलवे आगे भी दिखेंगे। **सूखी हवा से पानी**। वैमिस्टी में 2025 का नोबेल सूक्ष्म स्तर की छिनियों के विकास के लिए मिला है, जिससे कार्बन डायॉक्साइड सूखी जा सकती है और रेगिस्तान की विसृजित सूखी हवा से भी पानी निकाला जा सकता है। मैडिसिन का नोबेल शरीर की प्रतिरोधी प्रणाली पर काम के लिए दिया गया है- खासकर रक्तिय या कैंसर जैसे हालात के लिए, जब शरीर खुद को ही मारने में जुट जाता है। **बनी रहें छवि**। नोबेल पुरस्कार देने वाले मुलक स्वीडन के बारे में आम राय यही रही है कि वह किसी का दबाव नहीं मानता। दुनिया के जो हालात हैं, उसमें किसी न किसी खेमेबंदी का हिस्सा बनना हर देश की मजबूरी है। फिर भी, नोबेल को एक देश से बांधकर कोई नहीं देखता और उसको यह छवि आगे भी बनी रहे तो बेहतर है।

मर्तिल (लेखक यदिव पत्रकार है)

How innovation drives economic growth

Who won the Nobel prize for Economic Sciences this year? What is the difference between propositional knowledge and prescriptive knowledge? What is the theory of creative destruction? How much should a country invest in research and development?

EXPLAINER

T.C.A. Sharad Raghavan

The story so far

In October 13, the Royal Swedish Academy of Sciences announced that it had decided to award the 2023 Sveriges Riksbank Prize in Economic Sciences to Joel Mokyr, Philippe Aghion and Peter Howitt "for having explained innovation-driven economic growth". One half of the prize goes to Mr. Mokyr, while the other half will be divided between Mr. Aghion and Mr. Howitt.

Who are the winners?

Joel Mokyr was born in 1946 in Leiden, the Netherlands. He is currently a professor at Northwestern University. According to the award citation, he won the prize "for having identified the prerequisites for sustained growth through technological progress". Philippe Aghion was born in 1956 in Paris, France. He is currently a professor at Collège de France and INSEAD, Paris, and The London School of Economics and Political Science, U.K. Peter Howitt was born in 1946 in Canada and is a professor at Queen's University in the U.S. Mr. Aghion and Mr. Howitt jointly won the other half of the award "for the theory of sustained growth through creative destruction".

What was Joel Mokyr's work?

To understand the work of all three economists, one must first understand the fact that global growth has been unusually sustained over the last 200 years, following centuries of stagnation. The work of all three economists, in different ways, tries to answer what happened in the last two centuries that set them apart. This will also help create a model of sorts for sustained growth into the future as well.

Through his research in economic history, Mr. Mokyr showed that a sustained flow of "useful knowledge" is



High honour: Recipients of the Nobel Prize in Economic Sciences announced in Stockholm, on October 13, at

necessary for sustained growth. This useful knowledge, he theorised, has two parts: propositional knowledge and prescriptive knowledge. Propositional knowledge basically has to do with looking at the natural world and figuring out why something works. Prescriptive knowledge refers to actual practical instructions, drawings or recipes that describe what is necessary for something to work – like an instruction manual.

He argued that, prior to the Industrial Revolution, the world's leading innovators had a good command of propositional knowledge. That is, they had strong theories, after observing the world, of why things worked. This propositional knowledge, however, did not rest on a bedrock of prescriptive knowledge. Without the latter, it became next to impossible to build upon existing knowledge. This changed in the 16th and 17th centuries, Mr. Mokyr argued.

Scientists started including precise measurement methods and controlled experiments in their work, and began to insist that results be reproducible.

What were implications on policy?

The policy prescription of Mr. Mokyr's research was twofold. The first was that new ideas would become a reality only if practical, technical and commercial knowledge was abundantly available. Without these, he argued that even brilliant ideas such as Leonardo da Vinci's helicopter designs would remain on the drawing board, as they indeed did. He argued that sustained growth first took place in Britain because it was home to many skilled artisans and engineers who were able to transform ideas into practical and commercial products, which was vital in achieving sustained growth. The policy implication from this is that governments must invest heavily in

skilling if they want sustained growth. The other factor – and policy prescription – for sustained growth was that society should be open to change. Innovation invariably creates winners, but it also creates losers as new technologies replace existing ones. This can often lead to resistance to change from established interest groups.

What about Aghion and Howitt?

These two economists took the idea of "creative destruction" – where innovation leads to gains, but also the destruction of the incumbents – and created a mathematical model to capture it. They showed, through maths, how technological advancement leads to sustained growth.

The model developed by both of them can be used to analyse whether there is an optimal volume of R&D in society. There are two opposing trends here, as per the developed model. The first trend is that, when a new innovation comes in and replaces another, the benefits from the replaced technology still continue to flow to society, even if the company that developed it is no longer making profits from it. In other words, technology that has been outcompeted has more value for society than for the company that developed it. This makes it imperative that R&D be subsidised. However, the other competing trend is that when a company comes up with an innovation that rises to the top of the chain, it starts receiving bulk of the profits even though the actual improvement might have been only incremental. For society, the gain from this new technology is limited because it is only a relatively small improvement over the older technology. In such a scenario, investments into R&D might be too high. Therefore, under this trend, R&D should not be subsidised.

The answer to the question of how much R&D needs to happen will thus vary depending on the society and economy in question, but the model developed by the two economists lends a lot of insight into how to arrive at this optimal level. **WV**

THE GIST

Joel Mokyr won the prize "for having identified the prerequisites for sustained growth through technological progress".

Mr. Aghion and Mr. Howitt jointly won the other half of the award "for the theory of sustained growth through creative destruction".

Through his research in economic history, Mr. Mokyr showed that a sustained flow of "useful knowledge" is necessary for sustained growth. Mr. Aghion and Mr. Howitt took the idea of "creative destruction" – where innovation leads to gains, but also the destruction of the incumbents – and created a mathematical model to capture it.

THE REAL CLASSROOM TEST

Amid polarisation and narrowing opportunities, it must foster empathy, curiosity



RADHA GOENKA

WHETHER IT IS Charlie Kirk, abortion rights or immigration laws, in recent years, the world has witnessed an alarming rise in polarisation. This is evident in various aspects of life, from political discourse to social interactions. People are more divided than ever and the ability to address pressing global issues like climate change, which requires collaboration, is severely hampered.

Amidst this backdrop, education emerges as a powerful tool to bridge divides and foster understanding. Good education goes beyond imparting knowledge; it cultivates critical thinking, empathy, and the ability to engage in respectful dialogue. By exposing students to diverse perspectives and encouraging open-mindedness, education can play a crucial role in reducing intolerance and promoting social cohesion.

Educational institutions have the responsibility to create neutral environments where students can learn to appreciate differences and develop skills needed to navigate a polarised world. As elite institutes like Harvard and Columbia in the US and Ashoka and JNU in India are dragged into mainstream news, we must think of how, as a society, we can maintain an independent education system that can uphold its ability to shape independent thought.

We live in a world where there is a scarcity of opportunities in education. A world where admission to the best institutes — whether it is IIT or Harvard — feels like a war zone. Competition in India is higher than at any other time in history because of

a growing young aspirational population. This year, more than 2 million people sat the entrance exam for medical college, competing for just 140,000 places, while more than 1 million students sat the engineering exam in the hope of getting one of the 10,000 places at an IIT. This mad rush translates into the boom of towns like Kota that have built an entire economy around coaching classes.

Indians pursuing elite US institutes go through a similar struggle. Getting into an Ivy League college becomes their ultimate life goal and definition of success. With the current fluctuations in the US immigration laws, these students now find themselves on edge about their long-term prospects. It is therefore an appropriate time to pause and reflect on what we are really seeking from these elite institutes and do they provide us with the same.

The fundamental requirement is a good education. Therefore, the question is what comprises a good education and what is its end goal. The most obvious answer is that education helps us earn a living. We learn skills that we can use to make ourselves useful in society and, in turn, get paid for. The more complex the skill, the higher the compensation. But this gets infinitely more complicated to quantify when we talk about nuanced skills like management or leadership, which are a stronghold of elite universities. Businessmen, politicians and spiritual leaders, all of whom are at the forefront of shaping society, are often self-taught or have minimal formal education.

Does going to an elite college then guarantee success? Would you consider Donald

Trump, a graduate of Wharton, to be a role model, or does his story remind us that elite degrees don't always equate to strong character and responsible leadership? What about Bill Gates, who dropped out of Harvard but transformed global technology? Or Dhirubhai Ambani, who never earned a formal degree yet built one of India's largest business empires.

Clearly, then, the link between a formal education at an elite university and success is not causal but correlational. Which brings us to a deeper question: What leads to success? The purpose of a good education must go beyond employability. A truly enriching education teaches us to question the world around us. It nurtures curiosity, independent thought, logic and empathy to forge our own paths of inquiry and discovery. In 2025, as artificial intelligence redefines skills, it may be time to reimagine what "good education" looks like.

In today's world of hyper-exposure, an educated population is also the cornerstone of a democracy. As media globally gets increasingly polarised, the ability to sift through misinformation, spot hidden biases, and ask the right questions is even more important. This ability empowers citizens to choose wisely in elections and hold the powerful accountable.

The answer is simple: A good education teaches us to think critically and ask the right questions, even the unpopular ones, which in turn enables us to accurately interpret the world around us and collectively shape it for the better.

The writer is director, RPG Foundation

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Does going to an elite college then guarantee success? Would you consider Donald Trump, a graduate of Wharton, to be a role model, or does his story remind us that elite degrees don't always equate strong character and responsible leadership? What about Bill Gates who dropped out of Harvard but transformed global technology? Or, Dhirubhai Ambani, who never earned a formal degree, yet built one of India's largest business empires,

Testing times

Each year, 22 million aspirants apply for one lakh central government jobs, exams with a cruel 0.5 per cent success rate. These aspirants spend their youth chasing a mirage, neither working nor building any skills. If a candidate spends one year, the wastage explodes to 824 crore human-days annually, representing Rs 5.59 lakh crore in foregone economic output

India is one of the youngest countries in the world, with over 80 crore population (about 65 per cent) under the age of 35. The nation is currently in its demographic dividend phase, a 50-year window (2005-2055) of economic growth potential, when the proportion of working-age individuals (15-64 years) is large enough to support children and the elderly.

However, realizing this dividend requires access to quality education, skills development, and job creation to ensure youth can fully contribute. The critical questions are: Will India capitalise on this opportunity? Are we sure our youth are not riding an altogether different bus?

Each year, about 22 lakh students take NEET-UG for two lakh MBBS and related seats and 14 lakh attempt JEE Main for 42,000 IIT and other spots. Assuming 2.5 years (912.5 days) of preparation per student, NEET's 20 lakh unsuccessful candidates spend 182 crore human-days. JEE's 13.5 lakh add another 123 crore, bringing the total to 305 crore wasted human-days annually. This translates into Rs 2.07 lakh crore in lost output, that could fund 115-390 new medical colleges with attached hospitals (Rs 528-1,760 crore each); and in the following year, 235-470 engineering colleges (Rs 440-880 crore each). For these 33 lakh unsuccessful students, their childhood is forever lost without any equivalent gain. If they had played a sport of their choice, some could have become successful professionals or at least enjoyed a healthier life.

Additionally, the NSS 80th round Comprehensive Modular Survey: Education; 2025 shows 27 per cent of students opt for private coaching at Rs 2,409 average, scaling to Rs 16,116 crore just for higher secondary levels. As per Infinium Global Research, India's coaching business is now worth Rs 70,000 crore, projected to double by 2028.

The problem extends beyond these two exams. Over 10 lakh aspirants appear for the Civil Services exam (CSE) annually,



targeting about 1,000 positions. This is dwarfed by the millions pursuing other government jobs (detailed below). Sanjeev Sanyal of the PM's Economic Advisory Council calls CSE coaching a "massive misallocation of talent," akin to a "mafia selling opium."

A lucky dip for selection would be more humane. It would at least save the time, money, and energy of lakhs, to be spent in other meaningful fields contributing to the nation's growth.

Children as young as 13 internalise a message of failure from a system designed to eliminate over 90 per cent of them, leading to lifelong trauma, depression, and sense of guilt over wasted time.

According to the NCRB's Crime in India 2023, India lost 1,17,849 students to suicide between 2013 and 2023. The number climbed to a record high of 13,892 in 2023 alone, a 6.5 per cent increase from 2022.

The United Nations Convention on the Rights of the Child (CRC) guarantees every child the right to develop their personality and talents to the fullest potential (Article 29), as well as the right to rest, leisure, and play (Article 31). India, as a signatory, is obligated to uphold CRC's core principle of prioritizing the 'best interests of the child.'

Moved by the suicide of a girl in a coaching centre, the Supreme Court, in *Sukdeb Saha v. State of Andhra Pradesh*, in July, had to issue guidelines to prohibit batch segregation and public shaming based on performance. In March, in *Amit Kumar v. Union of India*, the Court had set up a National Task Force headed by Justice S. Ravindra Bhat to recommend reforms in higher education.

The UNICEF YuWaah - iDreamCareer Bharat Career Aspirations Report 2025 finds that only 10.4 per cent of students have access to professional career counselling; 78 per cent lack any backup career plan. Among 21,239 students surveyed, merely 6 per cent had used any tool to identify their strengths and weaknesses, and very few

had access to psychometric assessments. Students denied this guidance are vulnerable to uncertainty and unqualified advice.

This career guidance gap has already had catastrophic consequences. Each year, 22 million aspirants apply for one lakh central government jobs, exams with a cruel 0.5 per cent success rate. These aspirants spend their youth chasing a mirage, neither working nor building any skills. If a candidate spends one year, the wastage explodes to 824 crore human-days annually, representing Rs 5.59 lakh crore in foregone economic output.

This tragedy is preventable: If students knew from Class 10 onwards that government job exams have a 0.5 per cent success rate, comparable to a school cricketer making it to the Indian national team, most would develop back-up plans, pursue skill development, or explore private-sector careers. Netherlands uses aptitude and personality assessments at age 15 to guide students. Students in many countries, including Cyprus, South Africa, Australia, Thailand, and Finland utilize psychometric tests for informed career and subject selection,

with professional support.

Exams need to be reimagined as coaching-resistant, scientific aptitude tests, not memory contests. The National Education Policy (NEP) 2020 proposes a high-quality common aptitude test "rather than having hundreds of universities each devising their own entrance exams."

India already has world-class models. The Services Selection Board (SSB) for the armed forces uses assessments of intelligence, personality, leadership, and judgment. Tests like Word Association, Situation Reaction, and Self-Description gauge psychological suitability for military service.

The armed forces' success in producing principled leaders is visible. Officers selected

by the SSB consistently demonstrate integrity, resilience, and a willingness to sacrifice for the national interest. In contrast, a system that rewards cracking an exam often overlooks substance. This risks creating a generation of professionals who are skilled at test-taking but may lack the strength to withstand administrative and political pressures or innovation.

For finding scientific innovators, India's National Olympiad programme could be leveraged. If only students who achieve a qualifying score in such exams were made eligible to sit for JEE or NEET, the candidate pool would shrink from lakhs to a few thousand genuinely qualified aspirants. Olympiads have proven to be one of the most effective ways to identify exceptional scientific talent.

The Economist in its article "How to Spot a Genius" (Sep. 27), research by R. Agarwal, P. Gaule, and Y. Jiang (2025) found that one in every forty gold medalists at the International Mathematical Olympiad later earns a major science prize, a success rate fifty times higher than that of MIT undergraduates. Half of OpenAI's founders began their journey through Olympiads.

However, the proposal might appear elitist and could face opposition for seemingly excluding rural and economically disadvantaged students who are less familiar with Olympiads.

The NEP's emphasis on holistic progress, competency-based assessment, and integration of vocational education needs massive investment in developing vocational academies on the German model, where a 'master craftsman' in mechatronics is valued and often earns more than a generic engineer. South Korea's economic miracle was not built by doctors alone, but also by technicians and designers.

Nobel laureate Abhijit Banerjee cautions that "the lives of our young are dominated by a testocracy masquerading as meritocracy." A nation aspiring to be the Vishva Guru cannot afford to let its best minds spend their youth memorising rather than innovating.



SRINIVAS MADHAV

The writer is a transparency and equality advocate and author

RED CARPET

Inviting foreign universities to India is part of the dream of the National Education Policy to turn the nation into a 'knowledge hub'. Southampton University has already opened a campus; Keir Starmer, the British prime minister, had said during his recent visit to India that eight other British universities will open campuses in this country. This could have been a good thing but for the discriminatory approach of the University Grants Commission. The University Grants Commission (Setting Up and Operation of Campus of Foreign Higher Education Institutions in India) Regulations allow foreign universities to decide on their course syllabus, duration, fees and salary. They need not have reservations like Indian educational institutions. Reservations are intended to bring healthy social change and also ground higher educational institutions in the socio-economic realities of the country. Without quotas, foreign institutions will be free to admit students who will be able to afford the fees they decide on, and there will be no concession for less privileged candidates. This is a divisive principle, and will move the universities away from the needs of the country. Not only that, they are allowed by the regulations to make a profit and repatriate the funds; it is likely then that the universities will become commercial propositions.

A group of academics in Delhi are opposing the UGC Regulations. Besides some of these objections, they also say that in case a foreign institution fails, the UGC has no way to safeguard its students. That makes it possible for fly-by-night institutions to make money quickly and disappear. There is another worry. With the salary to be decided by the institutions themselves, they may find it possible to recruit the best teachers from Indian universities to the latter's serious disadvantage. These objections would not have arisen if the UGC Regulations had some parity with the regulations that govern Indian HEIs. There the thrust is towards centralisation, regimentation, and over-regulation, which damage free inquiry into and exploration of all forms of knowledge. The foreign universities are not only being given full autonomy at every level, but there are also no policies for quality checks. The politics of this is puzzling. It seems blind to the fact that these regulations — or their lack — will not help the country either educationally or economically. That is not the best way to build a knowledge hub.

What Google's Nobels Tell Us

Cutting-edge scientific research will keep shifting to US Big Tech companies because they have lots more money than top US universities, and because AI is now at the centre of everything

Atanu Biswas



"Feeling lucky this morning to work at a company that has had 5 Nobel Laureates among our ranks - 3 prizes in 2 years!" Sundar Pichai, CEO of Alphabet Inc, Google's parent company wrote as Michel Devoret, chief scientist of Quantum Hardware at Google, and John Martinis, the former hardware leader at Google Quantum AI, shared this year's Nobel Prize in physics with John Clarke of University of California, Berkeley, "for the discovery of macroscopic quantum mechanical tunnelling and energy quantisation in an electric circuit."

Devoret, a Yale University professor as well, is still actively involved in Google's efforts to develop scalable and fault-tolerant quantum computers. The group that attained "quantum supremacy" in 2019 was led by Martinis. Martinis, however, left Google in 2020 and went on to co-found the quantum computing startup Qlab in 2022.

These Nobel Prizes may be a testament to the power of big tech to shape science research in today's world, although the important role of federal funding in launching and sustaining this world-changing research has been commended, and it's immensely important even now.

However, as Pichai congratulates the 2025 winners on their "incredible progress", it may be remembered that Demis Hassabis and John Jumper of Google DeepMind, who spearheaded the development of the company's AI model AlphaFold2, which predicts the structure of proteins based on their chemical sequence, shared the 2024 Nobel Prize for chemistry with computational biologist David Baker. AlphaFold2, which was being utilised for 200mn proteins globally, was dubbed a "complete revolution" by the Nobel committee.

There's Geoffrey Hinton too, who is frequently cited as one of the three godfathers of AI. Hinton left Google in 2023, expressing worries about proliferation of false information, the potential for AI to disrupt labour market, and the "existential risk" associated with the development of true digital intelligence. But his "foundational discoveries and inventions that enable machine learning with artificial neural networks" earned him the Nobel Prize in physics, nevertheless, a year later. Hinton also

received his Turing Award in 2018 while working at Google.

Thus, Google's recent Nobel strike rate is unquestionably far higher than that of even the top universities that have won the most Nobel Prizes, such as Harvard, Cambridge, Chicago, or Columbia. Is Google's recent success really a coincidence then? Or is it a product of how science and technology are evolving? Is it due to the recent global view and way of embracing science? Many of today's scientific developments are undoubtedly dominated by AI and quantum technologies, where a tech giant has both money to invest and a clear business interest. And "those [Nobel-winning] October mornings

of research and education elsewhere, The advent of the AI era in recent years, where the launch of ChatGPT can be viewed as a change point in the course of human civilisation, may be altering the dynamics of scientific research that have existed for two centuries. Science research may be shifting its centre of gravity to industry.

For instance, a sizeable portion of medical research, even at universities or research institutes, has been propelled for years by the interest and financial support of giant pharmaceutical companies. And as long as the necessary infra remains largely controllable therein, a significant portion of it still occurs within academia.

The dynamics are undoubtedly shifting quickly necessitating the construction of massive infra, especially in sectors where billions of dollars are required for both capex and opex.

For example, scientists from Elon Musk's brain-computer interfaces company Neuralink or a similar establishment might very well win the Nobel Prize in medicine in future if it's to be awarded for the advancement of human brain chip implants!

Naturally, academic institutions worldwide would find it difficult to raise such astronomical sums of money, as may be required for sophisticated AI or quantum research. Plus, there's a serious funding crisis these days. Trump 2.0 is slashing or closing research centres around US, including those at Environmental Protection Agency and National Institutes of Health. In many other post-pandemic economies, govt support for research institutes has drastically decreased.

As a result, we observe a change in which big techs are partly becoming the primary research hub for modern tech-driven science. The crucial question is whether this trend will endure or if it's merely a passing phase. Advances in AI and quantum technology, as well as their applications to physics, chemistry and medicine, are likely to dominate the scientific domain in the near future. For several tech giants, including Google, a triumphant Oct morning, thus, is becoming increasingly likely.

This changed scenario, along with the power of big tech companies over academic institutions, may persist until we reach a point where research in AI and quantum technology reaches saturation and we resort to the fundamental sciences again rather than mostly tech-driven advancements.

The writer is Professor, Indian Statistical Institute, Kolkata



are becoming much more frequent for us at Google!" Pichai can proudly write.

Scientists from companies have also won Nobel Prizes in the past. Ivar Giaever of General Electric in Schenectady, New York, who was awarded the 1973 Nobel Prize in physics for his research on tunnelling processes is a notable example. Akira Yoshino, an honorary fellow of Tokyo's Asahi Kasei Corporation, and two other scientists were awarded the 2019 Nobel Prize in chemistry for their work on lithium-ion batteries. However, until recently, Nobel-like top honours for scientists outside of academia were not very frequent.

Indeed, since the establishment of the University of Berlin in 1810, the "Humboldtian" university has served as a model for Europe and later for US research universities. It also acted as a foundational paradigm for the integration

Nobel for trio honours economic creation and destruction



JOHN HAWKINS
ASSISTANT PROFESSOR,
UNIVERSITY OF CANBERRA

THREE economists working in the area of "innovation-driven economic growth" have won this year's Nobel Memorial Prize in Economic Sciences.

Half of the 11 million Swedish kronor (about \$1.2 million) prize was awarded to Joël Mokyr, a Dutch-born economic historian at Northwestern University.

The other half was jointly awarded to Philippe Aghion, a French economist at Collège de France and INSEAD (Institut Européen d'Administration des Affaires), and Peter Howitt, a Canadian economist at Brown University.

Collectively, the trio's work has examined the importance of innovation in driving sustainable economic growth. It has also highlighted that in dynamic economies, old firms die as new firms are being born.

As noted by the Royal

Swedish Academy of Sciences, economic growth has lifted billions of people out of poverty over the past two centuries. While we take this as normal, it is actually very unusual in the broad sweep of history.

The period since around 1800 is the first in human history when there has been sustained economic growth. This warns us we should not be complacent. Poor policy could see economies stagnate again.

One of the Nobel judges gave the example that in Sweden and the United Kingdom, there was little improvement in living standards in the four centuries between 1300 and 1700.

Mokyr's work showed that prior to the Industrial Revolution, innovations were more a matter of trial and error than being based on scientific understanding. He has argued that sustained economic growth would not emerge in "a world of engineering without mechanics, iron-making without metallurgy, farming without soil science, mining without geology, water-power without hydraulics, dynamism without organic chemistry, and medical practice without microbiology and immunology."

Mokyr gives the example of sterilising surgical



DYNAMICS: Economic growth has lifted billions of people out of poverty over the past two centuries, returns

instruments. This had been advocated in the 1840s or earlier. But surgeons were offended by the suggestion they might be transmitting diseases. It was only after the work of Louis Pasteur and Joseph Lister in the 1860s that the role of germs was understood and sterilisation became common.

Mokyr emphasised the importance of society being open to new ideas. As the Nobel committee put it, "practitioners, ready to engage with science,

One of their models implies governments need to be careful how they design subsidies to encourage innovation.

along with a societal climate embracing change, were, according to Mokyr, key reasons why the Industrial Revolution started in Britain."

This year's other two laureates, Aghion and Howitt, recognised that innovations create both winning and losing firms. In the US, about 50 per cent of firms enter and 10 per cent leave the market each year. Promoting economic growth requires an understanding of both processes.

Their 1992 article built on

earlier work on the concept of "endogenous growth" — the idea that economic growth is generated by factors inside an economic system, not the result of forces that impinge from outside. This earned a Nobel prize for Paul Romer in 2018. It also drew on earlier work on "creative destruction" by Joseph Schumpeter.

The model created by Aghion and Howitt implies governments need to be careful how they design subsidies to encourage innovation.

If companies think that any innovation they invest in is just going to be overtaken meaning they would lose their advantage, they won't invest as much in innovation.

Their work also supports the idea governments have a role in supporting and restraining those workers who lose their jobs in firms that are displaced by more innovative competitors. This will build political support for policies that encourage economic growth, as well. The three laureates favour economic growth, in contrast to growing concerns about the impact of endless growth on the planet.

In an interview after the announcement, however, Aghion called for carbon pri-

orities to include economic growth consistent with reducing greenhouse gas emissions.

He also warned about the gathering "dark clouds" of tariffs that creating barriers to trade could reduce economic growth. And he said we need to ensure today's innovators do not stifle future innovators through anti-competitive practices.

The economics prize was not one of the five originally nominated in Swedish chemist Alfred Nobel's will in 1895. It is formally called the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel. It was first awarded in 1969.

The awards to Mokyr and Howitt continue the pattern of the economics prize being dominated by researchers working at American universities. It also continues the pattern of over-representation of men. Only three of the 93 economics laureates have been women.

Arguably, economics professor Rachel Griffith, rather than Mokyr, could have shared the prize with Aghion and Howitt this year. She co-authored the book *Competition and Growth* with Aghion, and co-wrote an article on competition with both of them.

Courtesy: The Conversation

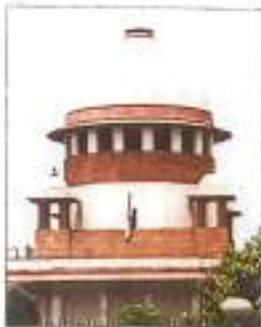
नवभारत टाइम्स • विचार

नवभारत टाइम्स | नई दिल्ली | बुधवार, 15 अक्टूबर 2025

यह जीवन एक संघर्ष है। जितना बड़ा संघर्ष, उतनी ही बड़ी सफलता। जीवन का मूल्य इस बात में है कि इसे कितना सार्थक बनाया - स्वामी विवेकानंद

लापरवाह रवैया

देश में कुल जितनी आत्महत्या होती है, उनमें 7.6% हिस्सा स्टूडेंट्स का है। केवल साल 2022 में ही 13 हजार से ज्यादा स्टूडेंट्स ने अपनी जान दे दी थी। इसमें से 2248 मामले परीक्षा में फेल होने से जुड़े बताए गए। देश के टॉप संस्थान - IIT, IIM और NIT भी इस अभिशाप से नहीं बचे हैं। 2018 से लेकर अभी तक IIT के 39, केंद्रीय विश्वविद्यालयों और NIT के 25-25 स्टूडेंट्स जान दे चुके हैं। इसके बावजूद इन संस्थानों का इस मामले को गंभीरता से न लेना समझ से परे है।



स्टूडेंट्स स्थूसाइड मामले

टास्क फोर्स । स्टूडेंट्स में आत्महत्या की बढ़ती प्रवृत्ति को देखते हुए सुप्रीम कोर्ट ने इस साल मार्च में एक नैशनल टास्क फोर्स का गठन किया था। रिटायर्ड जस्टिस की अध्यक्षता वाली इस समिति को शैक्षणिक संस्थानों में सर्वे कर रिपोर्ट तैयार करनी है। लेकिन, सुप्रीम कोर्ट में बताया गया कि इंस्टीट्यूशंस

सहयोग नहीं कर रहे। अभी तक केवल 3,500 संस्थानों ने जवाब दिया है, जबकि 57 हजार ने चुप्पी साध रखी है।

चुप्पी अक्षम्य । टास्क फोर्स की तरफ से इंस्टीट्यूशंस को चार बार रिमाइंडर भेजा गया, केंद्र की तरफ से निर्देश गए - इसके बाद भी यह चुप्पी अक्षम्य है। सुप्रीम कोर्ट को संस्थानों को चेतावनी देनी पड़ी है। जब शैक्षणिक संस्थान डांट-डपट से चलने लगे, तो उनसे कैसे उम्मीद की जाए कि वे देश निर्माण में योगदान देंगे। संस्थानों ने चाहे जिस भी बजह से सर्वे पर जवाब न दिया हो, उसे सही नहीं ठहराया जा सकता।

दबाव में बच्चे । बच्चों पर आज चौरफा दबाव है - पढ़ाई का प्रेशर, करियर में अच्छा करने की उम्मीद और परिवार की आकांक्षाएं। इनसे उनकी मेटल हेल्थ प्रभावित हो रही है। तमाम स्टूडेंट्स लगातार असफलता के डर से जूझते रहते हैं और झिझक की वजह से किसी से अपनी बात कह नहीं पाते। जब दबाव असहनीय हो जाता है, तो इन्हीं में से कई हिम्मत हारकर गलत कदम उठा लेते हैं। अगर उनकी समस्या को समझने और मदद का मैकेनिज्म मौजूद हो, तो कई जानें बचाई जा सकती हैं।

गलती सुधारें संस्थान । सुप्रीम कोर्ट की ओर से गठित टास्क फोर्स को स्टूडेंट्स की आत्महत्या के प्रमुख कारणों का पता लगाना है, मौजूदा मानसिक स्वास्थ्य नीतियों व नियमों को परखना है और साथ ही सुधार के उपाय सुझाने हैं। लेकिन यह काम शैक्षणिक संस्थानों के सहयोग बिना नहीं चल सकता। उनको तो बढ़-चढ़कर इस अभियान का हिस्सा बनना चाहिए और अपनी तरफ से सुझाव देने चाहिए।

Evolution, revolution

The economics Nobel is a nod to
freedom and innovation

This year's Nobel Prize in Economic Sciences has been awarded to Philippe Aghion, Peter Howitt and Joel Mokyr, who have, over decades, attempted to explain humanity's unprecedented progress over the past two centuries. While Mokyr has provided the long historical and cultural context, Aghion and Howitt have given it a formal mathematical frame or the "creative destruction" model. The idea itself is older. It originates with economist Joseph Schumpeter, who described capitalism as an evolutionary system in which innovation continuously displaces old technologies, firms and industries – a process both creative and destructive. But Schumpeter's framework rested on certain assumptions: that markets are free, competition is open, and the state acts only as an enabler of private enterprise, not as a driver of innovation. This assumption sits uneasily with the historical record. The long vision of the erstwhile Soviet state, and now the Chinese model of developmental capitalism, reveal how the state itself can shape and direct innovation. The creative destruction model, refined by Aghion and Howitt in the early 1990s, emerged during the twilight years of the Cold War, just as the Washington Consensus and neoliberalism became the dominant global economic paradigm. These models reinterpreted Schumpeter's idea in mathematical form through the endogenous growth theory – the notion that long-term growth is generated not by external forces but by innovation, education, and research arising within the economy. Crucially, it assumed that competition and private incentives – not central planning – are the engines of technological progress.

But the Nobel recognition comes at a time when the very conditions for this model to succeed have been upended by U.S. President Donald Trump. His administration has weaponised global trade, politicised science and technology, and turned markedly protectionist, departing from the open, rent-seeking capitalism of the post-war American economic order. While the creative destruction and endogenous growth models remain powerful tools to understand progress within a specific system – that of neoliberal capitalism – they fail to explain the exponential technological advances of state-led economies such as China. These models also overlook how geopolitics, institutional fragility and widening inequalities can reshape the very structure of innovation. It is thus telling that the Nobel Committee has chosen to honour a framework whose ideal conditions – liberal markets, global openness, and scientific freedom – are under strain. This perhaps must be viewed as a warning that for liberal democracies to thrive, they must not renege on the ideals of institutional freedoms within state-enabled capitalist societies. *u/c*

FADING
WORDS

The Vanishing Art of Writing

Writing is not just a skill — it's a neurological exercise in memory, focus, and identity. As automation and AI redefine learning, writing risks extinction — and with it, a part of humanity's intellect



NABANITA GHOSH

THE WRITER IS
AN ASSISTANT
PROFESSOR AT
CHRIST UNIVERSITY,
BANGALORE

The decline of writing is not merely a cultural shift but a cognitive one — automation is rewriting how the next generation learns to learn

The lexical meaning of writing is subtly abstract because when utterances become impossible, writing comes to the fore. Thinkers, philosophers, and authors sketch their thoughts through writing, which in today's world is gradually fading as the modern generation embraces digitisation. It is no wonder that an unlucky day is soon going to dawn in the lives of future children when the school bag will be preserved in a museum, and the tablet will be the sole signature of learning. Some schools have already begun introducing the concept of "No Bag Day" once a week. Undeniably, the thought is much appreciated, considering the weight of school bags and the age of the children, but overpowering automation in place of traditional learning remains somewhat incompatible.

Gen Alpha does not trust the art of writing; instead, it finds genuine comfort in listening to digitised platforms, showing a tumultuous variation in concentration and consistency. The merits of writing are now retrievable only from literature, which teachers once used to discuss with their students in classrooms by displaying the content on projectors. Technological adaptability lies at the fulcrum of a nation's successful development, and therefore, learning the nuances of technology is vitally important. Change is inevitable, but welcoming it exclusively for inclusive growth is what is both acceptable and attainable. Looking slightly back, from Gen Alpha to Gen Z, it is evident that difficulty persists in writing at a stretch—be it in examinations or while taking running notes—whereas glancing through onscreen material has become a blissful alternative. This slack in the art of writing not only obstructs its mobility but also retards the smooth development of the brain. The nexus among linguistics, memory, and critical thinking holds strong in improving cognitive functions such as reasoning and comprehension.



As Gen Alpha turns to tablets over notebooks, automation threatens to erode more than handwriting

Moreover, writing inculcates a sense of self-discipline and confidence among learners. The eras of baby boomers, Generation X, and to some extent, Millennials placed their trust in writing from childhood, as computers then were still in their infancy—particularly in developing and underdeveloped nations. Left with no choice, they grew up healthily with pen and paper, enabling them to experience less difficulty in expressing, remembering, and sharing ideas and opinions with others.

Kindergarten today tries to instil the habit of writing through various glittering contemporary methods, unlike the earlier generations, for whom writing carried a spiritual purpose. The proverbial statement still holds true: "If you write, you will never forget." Fine motor skills, which are developed during childhood, remain undiluted through every phase of life. Unfortunately, Gen Alpha rarely accepts writing, owing to the mass availability of electronic gadgets, digital media, and ready-to-use content—often generated by unethically mastering AI tools. Today's learning happens through

PowerPoint slides, examinations revolve around MCQs, and marking systems have turned luxurious, as the levels of learners differ widely. Though blessed with better intellect, instant resources, and improved support, students often fail to maintain consistency and emotional connection. Constant interaction with robots and frequent Q&A sessions with AI tools create hindrances to the spontaneous flow of thought and originality. Children frequently complain of hand pain while writing, as the habit has faded with the rise of digital skills. When a child learns to grip a pen, it strengthens their hand muscles. When they trace and copy, their eye-hand coordination improves, and with these steps, they develop control and precision. If these practices are discontinued during middle or high school, the skills dwindle; excessive reliance on digital records separates them from the traditional art of writing.

Today, writing skills are steadily moving to the back burner, leading to the decline of memory power, concentration, and expressive ability. Learners bor-

row thoughts for their homework; adults overtrust ready-to-use devices to analyse and synthesise their project ideas, resulting in a lack of originality. The interest in curating literary work has become dormant. Narrow focus, low perseverance, and compromised self-regulation have become obstacles to developing artistic identity. Gen Alpha is now surrounded by sophisticated methods to make content memorable, as forgetfulness becomes inevitable in the age of automation. This generation lacks social skills and rarely engages in family communication; instead, they feel more comfortable with an iPhone or iPad. Though today's children are digitally adept, the reason also lies in the rise of nuclear families, single-parent households, parents' extensive workloads, and the absence of grandparents' warmth. Differentiated parenting, Gurukul-style teaching, and quality family time may help create lasting impressions in young minds. Gen Alpha needs improvement in their motor cortex, cerebellum, parietal lobe, and basal ganglia by practising writing to enhance audiovisual skills, coordination, and brain development. Reduced exposure to gadgets, lesser screen time, and greater involvement in physical activity can promote positive psychosocial growth.

A paradigm shift in education has undoubtedly taken place. The modern system of teaching and learning has embedded in its curriculum the tenets of the Indian Knowledge System—its beliefs and practices—to uphold the spirit of excellence in service. Automation can and should be embraced, but not at the cost of the core values of writing, reading, and the ability to interpret and express ideas. Furthermore, to voice against corruption and warfare against the odds, we need true protesters—vocal, courageous, and articulate. And for that, the pen must continue to make the sword less mighty.

Views expressed are personal

The Three Questions That Guide Every Big Decision

DR SANKU BOSE

In my dual role as the Group CEO of Techno India Group and the Vice Chancellor of Sister Nivedita University, I often find myself standing at crossroads that demand difficult decisions — some financial, some academic, and many deeply human. Each choice can shape the direction of thousands of students, teachers, and families who place their trust in our institutions. Over time, I've realised that experience, data, and advice — valuable as they are — can only take you so far. What truly helps me navigate complexity is reflection. And to reflect, I rely on three simple but powerful questions. They've become my compass. Before taking any big decision, I pause and ask myself: Why am I doing this? Who does it benefit? And will I be proud of these five years from now?

These questions may sound simple, almost obvious. But they hold surprising depth. They help me look beyond the noise, strip away ego and urgency, and arrive at clarity.

The first question I always ask is "Why am I doing this?" Intention is the foundation of every meaningful decision. Before greenlighting a new university initiative, launching a programme or entering a new partnership, I ask myself why. Is it aligned with our long-term mission, or am I being swayed by pressure, prestige, or the fear of missing out? Students face a similar dilemma every day. Should you take that course because it truly excites you, or because everyone else is doing it? When you are clear about your why, decisions become lighter, cleaner, and more authentic. You stop chasing validation and start pursuing purpose. That single shift — from approval to purpose — can change your entire trajectory.

The second question is "Who does this benefit?" This one keeps me grounded. As a leader, it's easy to be seduced by numbers, optics, or short-term gains. But when I ask who benefits, I'm forced to think of people, not just outcomes. Does this choice serve our students, teachers, and communities, or is it driven by convenience? Does it make life easier for the people who depend on us, or just look good in a report? When decisions are made with empathy, they endure.

For students, this question is equally transformative. Before joining a club, volunteering for a project, or choosing an internship, ask yourself who benefits. Is this just about padding your resume, or does it help someone beyond you? Paradoxically, the more your decisions uplift others, the more they uplift you. Purpose and self-interest are not opposites — they are two sides of the same coin. The greatest satisfaction often comes from knowing your choices created value for someone else.

The third question I ask is "Will I be proud of this five years from now?" This question adds time as a filter and time is the most honest judge of all. When I imagine looking

back at a decision years later, the noise fades away. Popularity, convenience, even profit become secondary. What matters is integrity. Will I be able to look back and feel proud of this decision, not just for its outcome, but for the intent and courage behind it? For students, this is a powerful lens. Every career move, every friendship, every stand you take, all of it will age differently depending on the values that guided it. Ask yourself if the decision you're making today will still feel right when the excitement fades. If the answer is yes, it's probably the right one.

What these three questions really do is create a pause — a moment between the impulse to act and the decision to commit. And in today's world, that pause is becoming extinct. We live in an age of instant everything — instant replies, instant groceries, instant gratification. We are rewarded for speed, not depth. But good decisions rarely come from haste. They come from stillness. That one quiet moment of thought can change not just an outcome, but your entire direction.

WE LIVE IN AN AGE OF INSTANT EVERYTHING — INSTANT REPLIES, INSTANT GROCERIES, INSTANT GRATIFICATION. BUT GOOD DECISIONS RARELY COME FROM HASTE. THEY COME FROM STILLNESS

Ultimately, all our lives — whether we lead institutions or are just starting our journeys — are the sum total of the decisions we make. Titles, success, recognition — they are all byproducts of choices. So, the real question is not how many decisions you make, but how thoughtfully you make them.

The next time you find yourself at a crossroads — choosing a career, a friend circle, a belief, or a goal — pause for a moment and ask yourself the same three questions. If you can answer these with honesty, you'll find that clarity always follows. Because good decisions don't come from luck or intellect alone — they come from awareness. And awareness begins when you start asking the right questions!

The author is the Vice-Chancellor of Sister Nivedita University and Group CEO, Techno India Group. A visionary leader, he is shaping future-ready institutions and inspiring students to lead with purpose.

US visa curbs hit Indian students hard

With rejection rates at a decade high and visa approvals plummeting by nearly half, the once-favoured destination for higher education is fast losing its appeal



KALYANI SHANKAR

The visa crisis has particularly impacted international students, including those from India. There are growing concerns about the future of their education in the US. Approximately 1.1 million international students are studying in the US.

The recent crackdown on international students has intensified, with its impact now evident. There has been a sharp decrease in the number of student visas, with only 44.5 per cent issued compared to the previous year. Between January and September 2024, there was a 38 per cent decline in F-1 visas granted to Indians.

The 2023-24 academic year saw a rejection rate of 41 per cent for student visa applications, with 279,000 out of 679,000 applications denied. This has an impact not only on the students but also on the finances of the US. Indian students contribute over \$9 billion to the US economy, and recent visa policies have led to an 80 per cent drop in enrolments for the fall.

Disappointed, many students are exploring other avenues. For instance, the UK is opening new campuses in India as a promising alternative. China overtook India as the top country of origin, according to data. India was the top source of international students in the United States.

There was a dramatic drop, with 44.5 per cent fewer student visas issued than in the previous year.

As a result, the study area in the US has seen a significant decline. Between January and September 2024, there was a 38 per cent decline in the number of F-1 visas issued to Indian students.

During the 2023-24 academic year, the rejection rate for student visa applications reached a record high of 41 per cent, with 279,000 out of 679,000 applications denied.

The decline is primarily from cities like Hyderabad. Due to a freeze in US visa appointment slots and a spike in rejection rates, this would affect many aspiring students who are currently in limbo. The United States is witnessing a steep drop in Indian student arrivals this year, with education consultants reporting a 70-80 per cent dip in outbound traffic. The decline, primarily from cities like Hyderabad, is being attributed to a persistent freeze in US visa appointment slots and a sharp spike in rejection rates, leaving thousands of aspiring students in limbo.

Families play a crucial role and must provide support to international students during these challenging times. Already, the new visa policy has affected Indian students aspiring to study



The Pioneer
SINCE 1865

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The writer is a popular columnist.

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in the US, as Trump's H-1B visa fee hike could disrupt families. Many experts say this is not just a visa crisis but a broader education crisis, with Trump's policies making it increasingly challenging for Indian and international students. The quota for F, M, and J visa categories is now minimal. Only 9,906 F-1 visas were issued between March and May 2025, representing a 27 per cent decrease from the same period last year.

Additionally, since a policy change in June, the consular capacity in India has decreased. Experts expect a 70-80 per cent drop in student enrolments for the fall. In the 2023-24 academic year, the rejection rate was the highest in a decade, marking the highest denial rate in a decade. Out of 679,000 applications for F-1 visas, a significant 279,000 were denied.

This shows a notable rise from the previous year when 36 per cent of student visas were rejected. Immigration crackdowns, housing shortages, and significant policy changes are limiting options for Indian students.

In response, 14 US lawmakers have called for action. The Indian Government has warned people about illegal agents and has blocked more than 3,500 cases using e-Migrate. As a result, student enrolment for the fall has dropped by 80 per cent.

Trump's policies are significant and cannot be ignored. Families must understand the seriousness of the situation and provide unwavering support to the affected students. What

is the future of Indian students? Some of them are already exploring other options, such as the UK and Australia.

In Singapore and other countries, with limited possibilities remaining, students can transfer their admission to other countries where American universities have established branches. In short, America's loss is Europe's gain.

Visa issuance also dropped for Chinese students, but not at nearly the same rate. The United States issued 86,647 visas to students from mainland China in August, more than double the number issued to students from India.

The Government of India is actively engaging with the US Government to establish mutually beneficial and secure frameworks for student and professional mobility. These aim to provide a seamless visa process and facilitate the continued flow of students and professionals between the two countries.

There is an urgent need to address the visa issue, as students risk losing a year of their studies. Between January and September 2024, there was a 38 per cent decline in F-1 visas granted to Indians.

The 2023-24 academic year saw a record rejection rate of 41 per cent for student visa applications. The Prime Minister must engage with President Trump to expedite the resolution of this issue, as it directly impacts the future of higher education for many students. Losing one year will be costly for them.

Legal education and its drawbacks

RUPA BARMAN BORGOHAIN

The quality of legal education suffers from poor teaching, weak regulation, and commercialisation, demanding urgent systemic reform.

Legal education is a significant form of disciplinary education. A recent observation by the Chief Justice of India brings into focus the people associated with legal education—those who are first trained in law and then become trainers themselves. At the golden jubilee valedictory function of VM Salgaocar College of Law, Chief Justice BR Gavai stressed the need to maintain high standards in legal education. He stated, "These days there is a lot of focus on National Law Universities, but I believe other colleges are also producing bright students ... in mofussil colleges."

His observation is timely, and due importance should certainly be given to colleges in smaller towns. However, we cannot ignore the fact that certain deficiencies plague various law colleges. Such deficiencies may impact the education being imparted, and the standard of the students of these colleges might not be able to match that of the top National Law University (NLU) students. At present, there are about 27 NLUs, and the number of law colleges in the country ranges from 1,500 to 2,000. The Constitution has entrusted the regulation of legal education to both the Bar Council of India (BCI) and the University Grants Commission (UGC). All our great freedom fighters were from legal backgrounds, which made the Constitution-makers realise the significance of legal education. Unfortunately, in some parts of the country,

the standard of legal education might be questionable. The primary reason could be that those teachers entrusted with imparting lessons in law might themselves not have the requisite intellectual capacity. The Bar Council of India frames the broad outline and rules of legal education, although universities and law colleges have some degree of autonomy.

Legal teaching in different parts of the country suffers from various drawbacks. These issues might be related to outdated syllabi, a faulty examination system, incompetent and unaccountable teachers, a lack of research aptitude, and the over-privatisation of legal education. No one can dispute the notion that syllabuses ought to meet the demands of changing times. For example, the research paper requirement in the syllabus of some state universities might be made optional, as it should be pursued only by those students who are genuinely interested in research. Introducing such a requirement at an elementary level of the syllabus may not be particularly helpful to students, as legal studies are a professional course. The paper on Women and Child Law holds much more relevance. However, those involved in creating the syllabi often do not give sufficient weight to these facts, as they may have a vested interest in the choice of texts or in promoting their own areas of expertise.

Apart from this, the undue delay in the declaration of results, as well as discrepan-

cies or unfairness in these results, take a heavy toll on students. This has been happening in certain universities, and the injustice has not gone unnoticed. The supposed legal academicians associated with the law examination system should be fair, as there are often genuine reasons behind the grievances of meritorious students. Deepak Sibal vs State of Punjab highlighted the need to encourage legal studies without undue interference. If the legal faculty do not act reasonably in the allotment of marks, either in end-semester examinations or in internal assessments, then it also amounts to undue interference.

The most critical issue in our flawed federal education system is the lack of accountable, upright, and competent teachers. Securing UGC norms and obtaining a PhD degree alone do not make one a proficient teacher. The academic environment is crucial to raising the standard of education, and the onus here primarily rests on the faculty. However, when some faculty members are preoccupied with self-promoting activities, the academic environment inevitably deteriorates. There are many instances where dedicated and selfless faculty members are compelled to leave their institutions due to self-serving intrigue. The concept of the Socratic method of teaching, based on a genuine spirit of inquiry and debate, is not adhered to in such institutions. Perhaps it is time to adopt the exchange-teaching method, where law teach-

ers from any university or college could take classes at top-ranking NLUs. Reciprocally, the faculty of those universities ought to teach students of other institutions, as the latter's knowledge would be significantly enhanced. Another area that needs attention is the value of research papers, which are often used by some faculty members to further their careers. In this age of AI, research papers presented at seminars or published in journals can be produced with little effort. Rigorous screening should therefore be carried out to ensure that originality is preserved in legal education.

Too many private colleges may not enhance the standard of education. We are all aware that profit is the pivotal factor in privatisation, whether in education or other sectors. In *PA Inamdar vs State of Maharashtra* (AIR 2005), the Supreme Court held that education is an occupation, whether it be for charity or for profit, but it cannot be equated to trade or business.

The regulatory bodies of legal education have failed to play a vigilant and objective role. The saying "Too many cooks spoil the broth" might be loosely applied to the proliferation of regulatory legal authorities. Hence, a central university should be established as the supervisory body for all law colleges and universities. The Bar Council of India should only be associated with the legal profession and not with academics.

ART/17/4

Reimagining higher education

ABHAY G CHEBBI

India's higher education system stands at a transformative crossroads where national aspirations meet global expectations. With over 1,100 universities and 40 million students, the challenge today is not access but excellence—achieving self-reliance, innovation, and employability at a global standard.

The India Skills Report 2025 offers a mixed picture: Kerala records an employability rate of 90.94%, but many states lag behind, exposing deep disparities in academic quality and skill preparedness. Bridging these divides is essential if India is to emerge as a true knowledge superpower.

The National Education Policy (NEP) 2020 is India's most ambitious education reform yet, urging universities to blend Indian ethos with global competitiveness. Complementing it, the National Research Foundation (NRF) seeks to build a vibrant research ecosystem and make India an international hub for innovation and intellectual property.

Yet, challenges persist. According to the Economic Survey 2023-2024, India's R&D spending is just 0.64% of its gross domestic product – far below China's 2.4% and the United States' 3.5%. Only 36% of India's research funding comes from the private sector, compared with around 75% in the US and China. This imbalance highlights the need for stronger academia-industry-government links.

While leading private universities can nurture innovators up to Technology Readiness Levels (TRLs) – and even product manufacturing – India's scale demands a broader framework. Each state should establish an Innovation Council comprising academia, industry, and government to evaluate student ideas, set benchmarks, and link innovators to venture capital and manufacturing networks. Such councils would speed India's transition from lab to market, ensuring creativity finds real-world expression through mentorship, funding, and go-to-market strategies.

Self-reliance in education is not isolation; it is confidence – the ability to produce globally competent graduates while staying rooted in local contexts. Digital technology will be central to this shift. Initiatives like SWAYAM, NPTEL, and UGC-approved online degrees have already democratised learning. As India advances towards the 6G revolution, online and blended learning must

reach every learner. Regulations should encourage quality while ensuring affordability. Backed by public schemes and institutional partnerships, this digital infrastructure can make higher education truly inclusive – ensuring that no learner is left behind.

Self-reliance must go hand-in-hand with inclusivity. Universities should be required to offer merit-cum-need-based scholarships to support promising students from disadvantaged backgrounds.

Employability remains the Achilles heel of Indian higher education. Outdated curricula and weak industry linkages leave many graduates ill-equipped for modern workplaces. A National Talent Pipeline Consortium – bringing together academia, government, and industry – could develop standardised, future-ready curricula.

Leading companies could help define baseline competencies in AI, data analytics, sustainable manufacturing, and emerging technologies. Universities could then customise 20-30% of the curriculum to suit local needs. The Entrepreneurship Mindset Course (EMC) launched by the Punjab government is an excellent example. Targeting five lakh students by 2028-2029, it integrates entrepreneurial thinking with practical business skills.

Beyond coursework, universities should foster AI-integrated, interdisciplinary learning, where social sciences intersect with technology and ethics. This will produce graduates who are not only technically skilled but also empathetic and globally aware.

The next leap must come from embedding apprenticeship-based and cooperative education (co-op) models within degree structures. The government, through NIRF and accreditation frameworks, could reward universities that institutionalise co-op programmes where students alternate between academic study and industry engagement. This model, long practised in Canada and Germany, allows students to gain hands-on experience while earning credits.

India's rise as a global knowledge power will depend not merely on the number of universities it has, but on how effectively they nurture innovation, employability, and inclusion. The vision ahead is clear: an education system that is self-sufficient but globally connected, digitally empowered yet deeply human, and research-driven yet socially rooted.

(The writer is Pro-Chancellor, Alliance University)

04/11/25

Higher education policy perpetuates a paper mill

The call was from an unknown number and my colleague picked it up by mistake. The person on the other end, instead of hawking property in Noida or Gurgaon, mentioned that she belonged to a research organisation. This piqued my colleague's curiosity. He was stuck in one of the perennial rush-hour traffic jams in Delhi and so he continued the conversation.

What he found out was astonishing: The person told him that their organisation is in the business of getting one's research published in Scopus-listed or those listed by the University Grants Commission Consortium for Academic and Research Ethics (UGC CARE), for a fee. This was not all; you didn't need to actually do anything. They would even write the paper for you (of course, for an additional fee) and you could decide on the month when you wanted the paper to be published. When my colleague asked her to send all the details, she messaged him the details of the offer and continued a WhatsApp conversation subsequently with many messages regarding choice of journals, negotiations on fees, etc. This was not a cloak-and-dagger operation. It was all open and brazen.

The organisation had sensed a huge market opportunity, and was making the most of it — courtesy the mandarins who decide our higher education policy.

The first opportunity for such organisations came when the UGC mandated a certain number of research papers for promotion of teachers in colleges and universities. It then came out with a fairly comprehensive list of refereed journals (the UGC CARE list) in which they could be published. This obviously was meant to encourage research among the teachers and improve our ranking in the global pecking order of number of papers published — something that has become a fetish with our planners.

Clearly, the policy makers seemed to be completely ignorant of the conditions under which teachers, especially college teachers work in our country — poor or non-existent infrastructure, poor access to libraries (electronic or otherwise) as well as being overburdened with teaching and administrative work. This is not just the state of affairs in some maffus college — faculty in colleges of

Delhi University face similar issues. Teachers rarely have a decent place to sit (not to speak of laboratories), teach more than 16 hours in a week, grade and have to spend enormous time and energy keeping records and other administrative stuff. With all this, to expect the person to do cutting edge research and publish a number of papers to advance in her career could only have been thought of by a bureaucrat who was oblivious of the educational landscape.

In this state of affairs, it was only natural that some dodgy entrepreneur would step in and provide a useful service. Teachers paid a small fee to get the required number of papers, the organisation facilitating this made money and everyone was happy. What was more, the 'research output or papers' would add to the overall number of papers published by Indian researchers, thus making the rankings-obsessed bureaucrats happy. Never mind the quality of the 'research'.

This was the state of affairs till the much-awaited National Education Policy (NEP) was introduced. The undergraduate programme now offered students to continue for a fourth year. Colleges are supposed to handle an increase of 25% in student strength with no extra funding for infrastructure or for faculty.

When asked about how this will be managed, one of senior functionaries of Delhi University had a bizarre suggestion — the colleges should have their classes till 8.30 pm. Clearly, he was blissfully unaware of the fact that Delhi is almost at the very bottom of the list of cities considered safe for women.

The main emphasis of the fourth year in NEP is research where the students are supposed to carry out original research and either publish their findings in refereed journals or apply for a patent. The objective is clearly a noble one. Unfortunately, the objective conditions are not conducive. First, there is a selection effect for students who have opted for the fourth year. The good students have moved on to do their post graduate degrees and the majority of the students left to undertake this challenging task are precisely those who could not go anywhere. Lack of infrastructure and an over-worked faculty means that the students face an uphill task in doing the envisioned research.

Enter our publishing messiah as a saviour. Research publications (though, thankfully, no patents yet) can be delivered to the students who can then claim to have fulfilled the requirements for an Honours degree with research. And as the UGC has specified, if their performance is good enough, be eligible for a direct PhD.

The NEP has been lauded as the best thing that happened to Indian education. Many respected academics have pointed out several shortcomings in the policy. One would expect that the education policy makers would take heed of these genuine criticisms and do a course correction. Moreover, as they say, the real test comes when the rubber meets the road. Noble intentions and utopian ideals are laudable. Unless attention is paid to the ground realities, the net result would only make a mockery of the stated goals.



Shobhit Mahajan



The emphasis of the fourth year of graduation is research. Students must publish findings in refereed journals.

HT ARCHIVE

Shobhit Mahajan is professor, department of physics and astrophysics, University of Delhi. The views expressed are personal.

20/10/23

SILENT
LAUREATES

The Nobel Disconnect

India's absence from the Nobel roll says less about talent and more about cultural geography, translation politics, and Western literary gatekeeping



MOUSUMI ROY

THE WRITER WRITES
ABOUT POLITICS,
MATERIAL CULTURE,
AND ECONOMIC
HISTORY

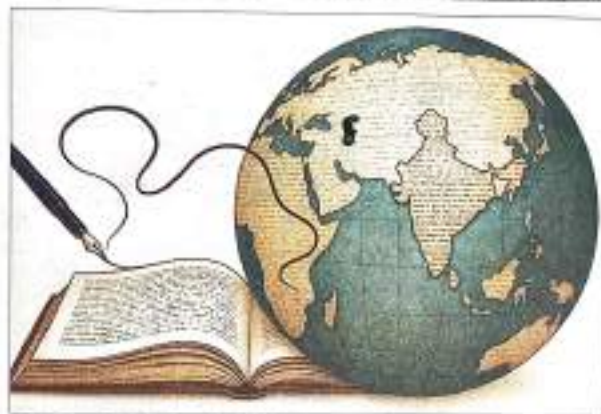
A century after Tagore, Indian literature continues to dazzle in a thousand tongues. Yet the Nobel remains distant — not for want of brilliance, but for the world's unwillingness to look beyond its own lens

When Rabindranath Tagore received the Nobel Prize in Literature in 1913 for *Gitanjali*, he not only became the first Indian but also the first Asian to be recognised by the Swedish Academy. His award symbolised the entry of an Eastern literary voice into the canon of world literature. Yet, more than a century later, India has not produced a second Nobel laureate in literature. This absence invites reflection in a country with hundreds of languages, a vast reading public, and a remarkable literary heritage.

It would be absurd to suggest that India has not produced writers of Nobel calibre since Tagore. On the contrary, the list of prominent Indian authors in English and regional languages is extensive. In just the past few years, Indian writers have twice claimed the International Booker Prize: Geetanjali Shree in 2022 for her Hindi novel *Tomb of Sand* (translated by Daisy Rockwell), and Bano Mushtaq in 2023 for her short story collection. Figures such as Salman Rushdie, Arundhati Roy, Amitav Ghosh, Vikram Seth, and Jhumpa Lahiri have won numerous international awards and are regularly featured on global shortlists. If literary merit alone determined Nobel outcomes, India would have produced multiple laureates by now.

The explanation lies less in the quality of Indian writing than in the geography of recognition. The Nobel Committee has long favoured the Euro-Atlantic literary tradition. Statistically, most laureates have come from France, followed by the United States, the United Kingdom, and Germany. Even Sweden, home to the prize's founder, has produced several winners — perhaps an inevitable case of institutional proximity.

By contrast, Africa has produced only five Nobel laureates in literature, two of whom, Nadine Gordimer and J.M. Coetzee, belong to the European literary lin-



From Tagore's *Gitanjali* to today's polyphonic voices, India continues to write its place in the world's literary imagination

age rather than the indigenous African one. Asia's record is marginally better, yet countries with rich literary histories, such as India, China, and Japan, remain far behind the European giants' representation. The Nobel's pattern thus reveals an implicit cultural preference: European literary aesthetics, individualism, irony, and existential introspection are often treated as the universal standard, while other literary traditions are viewed through an ethnographic lens rather than a philosophical one.

The Committee's institutional composition partly explains this imbalance. It remains anchored in a European interpretive framework, more attuned to the stylistic and thematic conventions of the continent's literature than the narrative modes of Asia, Africa, or Latin America. Works steeped in oral traditions, collective memory, or mythic temporality tend to resist easy translation into the modernist idioms the Committee prizes.

Recognition also depends on circula-

tion. While ostensibly celebrating literary achievement, the Nobel Prize also functions as a mechanism of global visibility. Its winners are rarely the most commercially successful authors but rather those considered "writers' writers" — complex, demanding, and stylistically innovative. The award amplifies rather than discovers such voices.

Indian authors, by contrast, already possess substantial domestic readerships and often command transnational followings across South Asia and the diaspora. Yet their entry into Western literary markets, especially for works written in regional languages, depends on translation. Until recently, few Indian works outside English reached the global literary circuit. The success of *Tomb of Sand* demonstrates that translation, when done with cultural sensitivity, can bridge this divide. Still, the global market tends to privilege certain narratives: postcolonial trauma, spiritual exoticism, or diasporic displacement frames that fit

comfortably within Western expectations of "Indian literature."

The Nobel Committee, in turn, rewards such recognisable forms of otherness while neglecting the full diversity of India's literary modernities — its political satires, linguistic experiments, feminist regional fiction, and Dalit autobiographies that challenge canonical hierarchies. Thus, India's absence from the Nobel roster reflects not a scarcity of genius but a misalignment between literary value and cultural visibility.

Treating the Nobel Prize as the ultimate arbiter of literary worth is a colonial hangover. The prize reflects not only aesthetic judgment but also geopolitical hierarchy. Yet the growing international recognition of Indian writers in translation suggests a slow erosion of that hierarchy. As more regional voices reach global audiences through digital publication, translation collectives, and small independent presses, the European centre of literary gravity is beginning to shift.

When India eventually produces its second Nobel laureate, it will not be a return to Tagore but a redefinition of what global literature means.

Tagore's *Gitanjali* was celebrated for transforming the mystic lyric into a universal idiom. The next laureate's work, perhaps drawn from the tangled polyphony of India's linguistic landscape, will likely reflect a different kind of universality: one born not from transcendence but from multiplicity. Until then, Indian writers continue to shape world literature without needing Stockholm's sanction. The Nobel remains a powerful symbol, but the vitality of Indian letters lies in the living languages of its people in novels that bend syntax, in poems that cross caste, gender, and geography, and in stories that remind us that literature's greatness is never confined by geography, prize, or translation.

Views expressed are personal

Invoking the Greater India of scholarship

Look East 1.0

T.C.A. RAGHAVAN

The Ashutosh Building on the College Street campus of Calcutta University was, from 1904, also the site of an unusual scholarly and historical enterprise. In one of its rooms consolidated a fraternity of historians who specialised in ancient Indian history — archaeologists, epigraphists, art historians and others. This became the headquarters — “siege social” as they termed it — of the Greater India Society established in October 1926. Next October will mark the centenary of its founding.

By the time the Society had moved to the Ashutosh Building, it had already demonstrated its academic and staying power. It had published a number of monographs, regularly organised lectures and seminars, and had started a scholarly journal titled *The Journal of the Greater India Society*.

The aim of this Society was, as its title suggests, studying ‘Greater India’. By this, what was meant was the systematic study of ancient India’s cultural footprint across Asia. Present-day Tibet, Central Asia and Southeast Asia fell within this ambit but, almost from the outset, the real interest in and the sharpest focus on were the territories that today comprise Malaysia, Myanmar, Thailand, Cambodia, Vietnam and Indonesia.

In this region, a mass of historical and archaeological evidence dated to the middle of the first millennium showed a proliferation of Indian scripts, languages, religions, architecture and iconography. From the 19th century, French, Dutch and British historians — these countries were the three imperialisms that dominated the whole of Southeast Asia — encountering this evidence concluded that this was proof of a vast colonisation of this region by emigrants from ancient India — princes, priests and traders. The colonies they established amounted to a ‘Greater India’.

In the charged nationalist environment of early-20th-century India, this knowledge of past achievements provided succour to many traumatised by their current subject status. More importantly, it provoked the interest of historians, scholars and intellectuals. The formation of the Greater India Society also owed much to the inspiration from Rabindranath Tagore, his travels and his interest in the remnants



Prasat Kravan temple, Cambodia

of Indian culture in different parts of Indonesia, Vietnam, Myanmar and elsewhere.

For the historians who comprised the fraternity of the Greater India Society, what lay at the core of their interest was the application of their scholarship developed for ancient India to lands distant from it. Their status as epigraphists, archaeologists and historians and their knowledge of Hindu and Buddhist architecture, iconography and literature equipped them to study ancient Southeast Asia. The nationalist environment they were embedded in and the imperialist framework in which scholarship on Southeast Asia was situated naturally attract greater attention. But the scholarly impulse that underwrote the Greater India Society still stands out in the numerous articles and books its members authored.

This fraternity included many of India’s best-known historians — R.C. Majumdar, B.R. Chatterjee, Nirajan Prasad Chakravarti, Prabodh Chandra Bagchi, Upendranath Ghoshal, Himanshu Bhushan Sarkar and others. It also included historians-cum-passionate-public-advocates of the Greater India idea such as Kalidas Nag. The names suggest that this was predominantly, but not exclusively, a Bengali fraternity. Names such as K.A. Nilakanta Sastri from the south and Bahadur Chand Chhabra from faraway Kohat at the other end of the subcontinent gave to the Society an all-India character.

What was of interest to each of them was understanding and deciphering this ancient Indian footprint across the whole of Southeast

Asia for well over a millennium: the kingdoms of Champa, Funan, Angkor, Dvaravati, Srikshestra, Sri Vijaya and others. To many of their Western counterparts — ironically enough, scholars from the ruling imperial powers — their scholarship was somewhat compromised because of their nationalism.

This judgement was resisted and pushed back against by the Greater India scholars. But as the age of decolonisation dawned and progressed, the use of the term, ‘Greater India’, or of ancient Indian ‘colonies’, did impact how many viewed the Greater India Society.

There were other weaknesses inherent in this scholarship. It consciously stopped from looking at what happened after these Hindu and Buddhist kingdoms ended and, indeed, how the Islamisation of Southeast Asia followed much the same trajectory as Buddhism and Hinduism had a millennium earlier. Islam had moved to Southeast Asia from both coasts of India following an earlier path established by Brahmin priests, Buddhist monks, and itinerant traders but these scholars were on the whole uninterested in Islam. Also problematic in the Greater Indian approach was that the role of the indigenous populations was never really explored and they were largely seen as receptacles of Indian ideas and culture.

By the end of the 1960s, all these factors plus a rapidly altering Asian geopolitics gave to the Society and its methodology the image of a somewhat anachronistic institution. The last issue of its famous journal came out in 1969 and the historiographical and scholarly

tradition it represented quietly petered out.

From the late 20th century, as *Hindutva* politics consolidated itself in India, there has been a natural tendency to seek to dig deep to analytically uncover its roots and identify its intellectual origins. In this context, attention by some Western scholars refocused on the Greater India Society. In their accounts, the Society was less about scholarship and more about public advocacy that acted as the forbear of a muscular Hindu nationalism ascribing to itself an imperial history and colonial conquests. In some of these treatments, the entire approach of the Greater India Society amounted to a kind of ‘epistemic violence’ being perpetrated on Southeast Asia. In effect, a moral equivalence is drawn between Indians studying ‘Greater India’ with the actual violence imposed by Western colonialism.

These tendentious claims can be disregarded. More important is to recognise the need to re-evaluate and build upon an often indigenous, scholarly tradition of studying Southeast Asia. October next year will mark the centenary of the founding of the Greater India Society. Whatever the infirmities of its historiographical approach or, indeed, its many other limitations, that scholarship remains the first and, to date, the only concerted effort by Indian historians to study non-Indian history. In an age where so much of our discourse is dominated by terms such as the Indo-Pacific or Act East, that surely counts for something.

T.C.A. Raghavan is a former High Commissioner to Pakistan and Singapore

Where'll Our Brain Train Go?

It has to head home. There's no certainty US hostility against Indian talent will go away with Trump. India's elite will have to demand & work towards building world-class universities here

Neeraj Kaushal



**Professor of
Social Policy**

Avenues that once brought Indians to richer countries are shrinking as nations like the United States turn increasingly hostile to immigration. Is this a passing storm or the glimpse of a new era?

The answer depends on two countervailing forces. The changing demography in rich countries portends rising need for foreign youth to fill universities and provide skilled workforce. The political success of anti-immigrant parties on the other end, portends increased severity of restrictions on immigration.

Universities in rich countries are facing an unprecedented challenge of shrinking enrolment resulting from smaller and smaller cohorts of youngsters graduating from high school and joining colleges. Across US, over 80 universities have closed down since 2020, 20 in 2024 alone, on account of falling enrolment and the resulting financial instability. The Federal Reserve Bank of Philadelphia has a financial stress test model that predicts as many as 80 colleges and universities will close permanently in the 2025-2026 school year, when many universities have also faced declines in enrolment of foreign students. International student enrolment in 2025 has fallen by nearly 20%. Indian students have faced the largest brunt with the number of the incoming cohort declining by close to 45%.

American universities have little leverage with the Trump administration. Indeed, the MAGA crowd is gleefully cheering Trump's crushing of America's education system, which they consider elitist and wasteful. Irony is that universities closing down are not the elitist private universities that generally have deep pockets, but many local small ones.

Yet, do not expect any relief on that ground in the issuance of student visas from Trump administration. What happens after the remaining years of Trump's presidency would depend on who the next White House occupant is, a Republican or a Democrat, and how Trump's war on America's education sector and immigration plays out with the general public.

In his 2024 campaign, Trump repeated the slogan of corporate leaders like Bill Gates and Steve Jobs – that all graduating foreign students be automatically offered a Green Card. As president, he has relentlessly pursued policies that have increased uncertainty for foreign students and graduates. With the latest move of raising visa fee to \$160,000 for new H-1B hires, Trump has made sure foreign students graduating from American universities do not get a job in US.

Corporations hiring skilled workers directly from foreign countries using H-1B visas will probably hire more workers on L-1 visas as intra-company transfers, first hiring them in a foreign country and subsequently bringing them to US. Unlike H-1B visas that have an

through a liberal visa system for foreign students and workers. The new battle cry is: US does not need the world's brightest. At a recent address to UN, Trump declared to Europe that those European countries taking immigrants, "are going to hell!"

Where does this leave Indian youth aspiring to emigrate to US for education and work? The short term looks bleak. Critics have incorrectly described immigration of Indians to western countries for education and work as brain drain. It is more correctly brain nourishment and circulation.

A substantial number of students and workers have returned to India and contributed enormously to the Indian economy in western universities and corporate cultures. Indian talent has flourished and become best in the world. Had they stayed in India, they would have excelled but not have become the world's best.

Indian elite and the middle class have in a way dissociated their personal lives from India's education system. Instead of demanding and working towards building many high-quality universities, they opted to send their children abroad. Others invested in sending children on the *dunki* route to emigration. Trump has successfully closed the latter, and is restricting avenues for the former.

So, India must build its own Oxforwards, Harvards and MITs. The time is ripe. Facing pressure at home, American universities are looking to open new campuses abroad. India should use this opportunity for building multiple online and physical universities involving domestic and global resources to educate

Indian youth in India.

The gap is enormous both in terms of quality and quantity. As an example, America with less than a fourth of India's population and an even lower proportion of youth entering college has over 3,900 universities, three times India's.

While India has opened the education sector to foreign universities and about a dozen or so have come in, which is of course better than nothing, it is nowhere near what we need. Trump or no Trump, a quality and strong education system is a necessary foundation for building a developed nation.

The writer teaches at Columbia University, US



annual quota, L-1 has no annual limit. Yet, the virtual loss of H-1B, given costs involved, will leave corporate America scratching for talent. Expect more work outsourced to countries where the talent resides and of course increased AI-sation and robotisation.

Foreign workers, it is no exaggeration, built Silicon Valley. They are ubiquitous across all skilled sectors in US. Will corporate America be able to successfully lobby Trump govt for a less restrictive regime to bring in foreign talent? So far, it seems, while Trump is willing to bail out companies like Intel, on immigration he is not with corporate America.

In the past, US attracted the world's best and brightest

10/2/24

Decoding the Nobel winner: Peripheral immune tolerance

The discovery of Tregs has opened a thrilling new frontier in therapeutics, writes **Arun Panchapakesan**

We now know that T cells, a critical component of the immune system, mature in the thymus. It is here that they learn a crucial lesson: the thymus acts as a quality control centre, allowing T cells that recognise foreign pathogens to survive while eliminating those that would attack the body's own tissues. This process of weeding out self-reactive T cells is termed 'central tolerance'.

While studying this process in the late 1960s and 1970s, scientists observed something peculiar: Removing the thymus in newborn mice not only weakened their ability to fight infections but, paradoxically, often led to autoimmune diseases, in which the body's own T cells attack its tissues.

The timing of the removal, however, produced a dramatic difference. Removing the thymus on day 3 after birth led to severe autoimmunity, whereas removal on day 7 largely protected the mice from it. This paradox suggested that something crucial must happen in the thymus between days 3 and 7 to prevent T cells from attacking the body's own tissues. The question was: what?

Although unknown at the time, we now know the thymus is not foolproof. Some self-reactive T cells inevitably escape into the bloodstream. Yet, they usually do not cause harm. The reason is a second line of defence known as peripheral tolerance—the very process those newborn mice were developing between days 3 and 7. The discovery of this process and the cells responsible for it earned Shimon Sakaguchi, Mary Brunkow, and Fred Ramsdell the Nobel Prize in Physiology or Medicine this year.

At the heart of peripheral tolerance is a specialised class of T cells, regulatory T cells (Tregs), which are also generated in the thymus. Tregs actively suppress immune responses directed against the body's own tissues. In mice, their development begins after day 3, explaining why removing the thymus on day 7 was not catastrophic: by then, enough Tregs had formed to keep the escaped self-reactive T cells in check.



Mary E. Brunkow and Fred Ramsdell of the United States and Japan's Shimon Sakaguchi won the Nobel Prize in Medicine for their research into how the human immune system is kept in check. **ar**

Tregs achieve this through several specialised mechanisms. Normally, when a T cell recognises its target, it rapidly divides and releases chemical signals to recruit other immune cells, such as B cells and macrophages. Tregs intervene to prevent this. For instance, they display a surface protein called CD25, which acts like a sponge, soaking up an essential growth signal (IL-2) that other T cells need to multiply. By capturing this signal, Tregs starve nearby T cells of the stimulus required for proliferation. Furthermore, Tregs release calming molecules like IL-10 and TGF- β , which directly suppress the activation of other immune cells and help restore balance once a threat has passed.

The CD25 molecule was key to Shimon Sakaguchi's groundbreaking identification of Tregs in 1995. At Kyoto University, he

showed that removing CD25-carrying T cells from healthy mice caused them to develop autoimmune diseases rapidly. When these same cells were reintroduced, the disease was suppressed, conclusively demonstrating that Tregs are essential for immune control.

This discovery raised a new question: how are Treg cells formed in the first place?

The answer emerged from the work of Mary Brunkow and Fred Ramsdell. They were studying a mysterious inherited disease in mice that caused severe immune activation and early death. Their research pinpointed a gene called FOXP3, which produces a protein that acts as a master regulator of immune balance. Mutations in this gene caused a complete loss of immune control, resulting in rampant autoimmun-

ity. Similar mutations were later found in children with IPEX syndrome, a rare and severe autoimmune disorder, confirming the gene's crucial role in humans.

Sakaguchi later showed that the FOXP3 protein acts as the master switch for Treg development and function, linking his earlier discovery of CD25 T cells to the genetic mechanism that gives them their suppressive power.

Today, we know Tregs do much more than maintain peripheral tolerance. They help control inflammation, prevent excessive tissue damage during infections, support wound healing, and influence metabolism. Consequently, Treg dysregulation is implicated in a range of diseases, from autoimmune conditions like type 1 diabetes and multiple sclerosis to cancers and chronic infections where the immune response is insufficient.

The discovery of Tregs has not only rewritten textbooks but also opened a thrilling new frontier in therapeutics. Scientists are now actively developing ways to harness the power of these cells. In one approach, they are creating therapies that boost the number or function of Tregs to treat autoimmune diseases and prevent organ transplant rejection.

In a seemingly opposite but equally promising strategy, they are developing drugs that temporarily inhibit Treg function within tumours, "releasing the brakes" on the immune system to help the body's own T cells attack cancer. This dual potential—to either suppress or unleash immunity on demand—highlights Tregs as a master control switch for human health.

These insights underscore the monumental importance of the Treg discovery. This year's Nobel Prize, therefore, recognises the identification of a fundamental principle of the immune system, and perhaps of life itself: that restraint is as valuable as aggression.

(The writer is an assistant professor of molecular biology at a Chennai-based research centre.)

20/10/25

How great institutions power great nations

Behind many of India's most remarkable achievements lies a common force: High-quality institutions that empower generations to build paths that once seemed impossible. From designing AI-powered mosquito-tracking systems that prevent disease outbreaks to breakthroughs in space exploration to artists from rural India performing on world-class stages, these milestones are not incidental. They are visible outcomes of decades of collective effort, deep, purpose-driven investment in the centres of excellence we have incubated and nurtured, and unwavering belief in human potential.

Born of visionary intent to confront India's defining challenges, and to reinforce its cultural mores and civilisational values, institutions such as the Indian Institute of Science (IISc), Bengaluru, and the National Centre for Performing Arts (NCPA), stand out as multi-generational legacies of impact. Across the decades, philanthropic leadership in India has not only supported existing centres of excellence but also actively incubated new institutions that address the emerging needs of our society.

Examples such as the Tata Institute of Fundamental Research (TIFR), Tata Memorial Centre and the Tata Institute of Social Sciences, illustrate how long-term philanthropy, rooted in partnership and mentorship, has helped seed early-stage organisations that have grown into nationally and globally recognised pillars of progress. This commitment to institutional incubation, from ideation, sustained mentorship, investment, and collaborative networks, has enabled pathbreaking solutions and empowered new generations of talent across health care, education, technology, and social sciences, con-

tributing to India's transformation.

The true imprint of such institutions does not reside only in history books or research papers. It lives in the stories of those who carry these learnings into the world — scientists, artists, and changemakers whose ideas, nurtured first in classrooms or laboratories, ripple outward, touching lives, shifting systems, and quietly redefining what's possible. We see it in rockets that carry hope and in breakthroughs in energy, health, and climate action.

Our past shows us what this looks like. Nobel Prize laureate CV Raman's leadership at IISc, Jayant Narlikar's stewardship of the Inter-University Centre for Astronomy & Astrophysics (IUCAA), Pune, and Homi Bhabha and JRD Tata's vision for TIFR — all left us stronger than before. They turned fledgling institutions into engines of discovery, built ecosystems that nurtured innovation, and laid the foundations for India's scientific self-reliance. We stand on the shoulders of such visionaries — inspired not just to protect their enduring impact, but to extend it.

As the nature of our challenges evolves, so must our institutions. India's aspirations multiply, and more Indians rise to meet them. The problems we face today cannot be solved in silos, be it the climate crisis, the AI evolution, or antimicrobial resistance. Consider this: By 2050, India could lose almost 3% of its annual GDP due to climate-induced productivity losses. At the same time, India's share of the global workforce is set to grow dramatically, creating both opportunities and responsibilities. These intersecting realities demand institutions that go beyond producing knowledge. They must break disciplinary boundaries and bring together technology, communities, and



Institutions are not just systems or structures; they are catalysts for dreams and launchpads for human potential. HT ARCHIVE

policy under one roof.

The role our institutions play in solving global problems has never been more crucial. The climate crisis is redrawing coastlines and straining health systems. In 2024 alone, 5.4 million people in India were internally displaced due to disasters like floods and storms, the highest in more than a decade. In such times, these must be more than places of learning. They must become platforms where diverse voices come together to co-create solutions at scale.

Institutions act as connectors and enablers; meeting people where they are and opening doors to a more equitable future. As Nobel Prize laureates Daron Acemoglu and James A. Robinson remind us in *Why Nations Fail*, inclusive, adaptive, and resilient institutions, and

not growth alone, make progress lasting and fair.

The true strength of institutions will be measured when knowledge translates into action. During the recent pandemic, Indian institutions were central to enabling the delivery of Covid-19 vaccine doses nationwide. Over two billion doses were administered, in turn protecting millions of people and strengthening public health systems. Similarly, in the clean energy sector, collaborations between scientists, universities and industry helped reduce the cost of solar power by more than 80% over the past decade, powering rural communities and driving livelihoods.

Institutions are not just systems or structures; they are catalysts for dreams and launchpads for human potential. They are the reasons that a young girl in Jharkhand dreams of curing cancer, or a first-generation student from Uttarakhand can lead clean energy research, or a musician from Rajasthan is able to share their art with the world on the stages of NCPA. In nurturing such aspirations, these centres build the very foundations of a more inclusive India — empowering citizens to contribute to the nation's transformation.

However, despite being living, breathing ecosystems and the country's inheritance to our children, they remain persistently under-resourced. Funding gaps restrict innovation, limit infrastructure, and constrain the next generation of innovators. This is where the Tata Trusts has shown that philanthropy can make a difference. Today, it continues to drive progress where it is needed most — whether enabling new research, funding early-stage innovation, or building collaborative platforms.

The future of our institutions will not be written by policymakers or philanthropists alone, but by how each of us chooses to support and reimagine them. Nations are not built overnight, but generation by generation, through institutions that evolve, endure, and empower.

Siddharth Sharma is CEO, Tata Trusts. The views expressed are personal. This is part of a series for Nobel Prize Dialogue India 2025 that will be held in Bengaluru and Mumbai on November 3 and 5.

HT/18 in partnership with Tata Trusts



Siddharth Sharma

The gift of Athena



Work of Nobel Laureate Joel Mokyr shines a light on path India must take to become a knowledge power

PRATAP BHANU MEHTA

WHEN I WAS appointed to the National Knowledge Commission in 2005, a colleague recommended that I read 2025 Nobel Laureate Joel Mokyr's book, *The Gifts of Athena*, to gain a broad understanding of how knowledge economies are produced. Mokyr is known as the non-economist's economist — not just because he uses economic theory in elegant and accessible prose rather than impenetrable math, but also because he resists a deeper economic reductionism that might be summed up as: "It's the incentives, stupid." Nothing has corrupted our thinking about development more than the language of incentives (which, of course, matter) colonising our ways of thinking about the social world.

For Mokyr, knowledge is not simply a tap that can be turned on by getting the incentives right — as if increasing demand or payments will automatically generate a response. Knowledge is not just another input where greater demand produces higher supply. In another book, *The Lever of Riches*, he put it dramatically: Necessity is not the mother of invention; one must also account for the capacity to respond to necessity. Knowledge economies are more difficult creations — more mysterious and more wondrous.

Another striking feature of Mokyr's work is his Weberian sensibility about historical causation. Social reality is causal but not law-like. Although his books have overarching arguments, they are attentive to complexity and to the conjunctures that make an argument work. In this sense, his work is much richer, and his histories more rewarding, than those of other historically-minded economists who have won the Nobel Prize, such as Douglas North or Daron Acemoglu and James A. Robinson. Their emphasis on institutions is salutary, but their account of institutional causality is ultimately too abstract and rests on a more simplistic and tendentious reading of history. Mokyr offers a genuinely historical and sociological critique of economics' dominant modes of thinking. He uses parsimony when appropriate, not as an end in itself. His history, like all serious history, will be controversial in parts, but never simplistic-minded. In *The Lever of Riches*, he is attentive to the conditions under which his explanations may not hold. One of the remarkable things about his histories is how much they make you think.

Mokyr's account is Weberian in another way: it makes space for the explanatory power

of ideas. But it is also a conjunctural account that links two forms of knowledge: Propositional knowledge, which concerns regularities in nature, and prescriptive knowledge, which is about techniques — how to make things work. The friend who recommended *The Gifts of Athena* thought its central argument especially relevant to the Indian context. Many societies have been good at discovery. But for Mokyr, the Industrial Revolution cannot be explained by factors like the comparative price of energy or heroic individual inventions. It was sustained by the interaction between propositional and prescriptive knowledge — between discovery and invention. The subtext for India was clear: Science and engineering need to be integrated into a productive feedback loop. This has been a structural weakness of the Indian knowledge system. The 20th century, Mokyr suggested, saw the deepest institutionalisation of the relationship between these two knowledge forms. But it remains controversial what actually enables such institutionalisation.

Mokyr's histories are somewhat sceptical of the state. Not only is the state bad at picking winners, it often prevents even known winners from realising their potential — as in China's past. Historically, and sometimes against the grain of his own narrative, Mokyr tends to downplay the role of the state in creating the preconditions for sustained innovation. Yet contemporary China now offers a living refutation of his thesis on the state, even as it vindicates his account of the feedback loops between different forms of knowledge.

The fascination of Mokyr's work lies in its claim about a shift in elite cultures. The explosion of interest in scientific knowledge among European elites in the early modern period was astounding. It is important to remember that this scientific temperament does not exist primarily at the individual level — many great scientists believed all sorts of weird things — but is embedded in the epistemic cultures of institutions. Mokyr does not reduce science to sociology, as sociologists of science often do: science has its own autonomy as a mode of human experience and as a causal force. What he conveys is how an elite culture forms around science: Institutions, networks of diffusion, and most remarkably, social conditions that spot talent and allow it to flourish. His account of the political dynamics of this shift in A

Culture of Growth: The Origins of the Modern Economy is interesting, if a little tendentious. It rests on the claim that a paradoxical combination produced Europe's intellectual dynamism: Political fragmentation combined with a trans-European republic of letters. States competed for talent, but within a culture that allowed ideas to circulate freely across borders.

But why was European fragmentation different from that elsewhere? Consider post-imperial fragmentation in other regions, including India. New intellectual histories of India make one wonder if something else is at work. One of the remarkable features of Indian intellectual history is how successfully it created a trans-political and open republic of letters. Not only were religious and literary texts widely disseminated, but a small town like Navadipa could become the epicentre of Navya-Nyaya logic in the 17th century — surpassing even Benares. Nyaya manuscripts became pan-Indian currency, despite political fragmentation. So India, too, had political pluralism and extensive elite circulation. Comparative literacy rates in 17th to 19th-century England and India are contested, at least if Dharampal is to be believed. The sad truth is that Indian economic, intellectual, and cultural history still has too many large gaps for the Indian case to be fully diagnosed. The few references to India in his work are comparatively flat, largely owing to the paucity of sources.

Mokyr forces us to confront a profound truth: Knowledge does not grow on its own. It is cultivated by cultures and institutions and legitimised by ideas. If India is serious about becoming a knowledge power, it must confront the structural disconnects in its own knowledge systems — the weak bridges between science and engineering, discovery and application, the factory and lab. It must learn to reward and match talent. The real challenge is not just investment or incentives, which we are throwing around freely. We will get easily dazzled by an odd win. ISRO or a new AI centre. The real challenge is building a sustained culture of innovation. Athena, or in the Indian context Saraswati, are not just goddesses to be worshipped: They have to become palpable social forces.

The writer is contributing editor
The Indian Express

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YOUTH
PULSE

Voices of Tomorrow

The Viksit Bharat Young Leaders Dialogue is a new democratic tradition that unites India's young minds in a shared conversation of policy, innovation, and imagination



PALLAVI JAIN GOVIL

THE WRITER IS
THE SECRETARY,
YOUTH AFFAIRS,
GOVERNMENT
OF INDIA.

So, to every young Indian reading this: the stage is set for you to take that first step. The idea that can transform India's tomorrow might just be yours

What if the next big idea that can transform India's growth story is already taking shape in the mind of a 17-year-old from Imphal, or a college student in Surat, or a young innovator in a village in Jharkhand? What if the solution to our most pressing challenges—be it climate change, sustainable agriculture, digital inclusion, or affordable healthcare—comes not from boardrooms, but from the fresh perspectives of young Indians who dare to think differently?

The Viksit Bharat Young Leaders Dialogue (VBLYD) was born from this very belief: that India's youth are not just future stakeholders but present-day partners in nation-building. VBLYD has been envisioned as a living platform that takes the ideas of our Yuva Shakti to the highest levels of governance, allowing them to present their perspectives directly to the Hon'ble Prime Minister Shri Narendra Modi. It is a tool for empowerment on an impressive scale—a structured, inclusive space where the voices of young people are elevated from the grassroots to the national stage.

Translating Vision into Action

The inspiration for VBLYD came from the Prime Minister's Independence Day call to engage one lakh youth without political backgrounds in public life. Acting on this vision, the Ministry of Youth Affairs transformed the National Youth Festival—held in the same format for over 25 years—into something hitherto unprecedented. Thus, in January 2025, the first edition of VBLYD was launched.

The outcome was phenomenal. More than 30 lakh youth engaged through the Viksit Bharat Challenge. Over two lakh essays were submitted, and 9,000 young people showcased their vision at the State level. The journey culminated at Bharat Mandapam in New Delhi, where 3,000 youth leaders, cultural performers, and achievers came together. The Hon'ble Prime Minister spent nearly six hours in free-flowing dialogue with them, listening to their ideas and inspiring them to take up leadership roles in shaping India's future. Eminent personalities from diverse fields, including business leaders, scientists and leaders in public life, joined the event, lending even greater gravitas to this youth-led dialogue.

More than the numbers, it was the nature of the engagement that made VBLYD 2025 historic. It recognised, not merely in letter but in spirit, that the voices of 15- to 29-year-olds matter in shaping the policies that will determine the Bharat of 2047.

Building on Success: VBLYD 2026

The second edition, VBLYD 2026, builds on this foundation with greater ambition and wider reach. Alongside the cultural and challenge tracks, two new verticals have been introduced: "Design



From quiz to conversation, VBLYD turns ideas into action and youth into leaders

for Bharat", a multi-tier national design challenge, and "Tech for Viksit Bharat - Hack for a Social Cause", a hackathon aimed at developing prototypes and solutions for the future. For the first time, the Dialogue will also welcome international participants—youth from the Ministry of External Affairs' "Know India Programme" and delegates from BIMSTEC nations—taking VBLYD beyond the scope of a national conversation, into a global one.

While changes may be introduced in form, the essence remains unchanged. The key focus remains on empowering young Indians to think, create, and lead. For most participants, this journey begins with one simple yet powerful entry point—the Viksit Bharat Quiz.

The Gateway: Viksit Bharat Quiz

Every ladder of leadership begins with a first rung. For VBLYD, that rung is the Viksit Bharat Quiz, hosted on the MY Bharat and MyGov portals.

This quiz is not just about testing knowledge; it is about opening doors. It has been thoughtfully designed to test knowledge on various aspects of our nation and to reflect the broader vision of Viksit Bharat. It aims to spark curiosity, foster active participation, and ensure representation from every State and Union Territory. Conducted in 12 languages, it ensures that every young Indian can participate in his or her own tongue. This linguistic inclusivity reflects the diversity of our nation and guarantees that no young voice is excluded.

The questions span India's history, development journey, and vision for the future, sparking curiosity and reflection in equal measure. More importantly, they

plant a seed: the realisation that each participant is a stakeholder in Viksit Bharat @2047. The winners of the quiz move on to the essay round, then to State-level presentations, and finally to the grand national dialogue. What begins as an online quiz could end with a young person standing before the Prime Minister, sharing his or her vision for India's future.

MY Bharat portal, on which the quiz is hosted, is a digital portal designed as a one-stop solution for youth engagement activities. It enables young people to access opportunities for learning, volunteering, leadership, and nation-building through various government and partner initiatives. The platform also facilitates mentorship, skill development, and recognition of youth contributions, fostering a stronger link between youth aspirations and national priorities. As of date, the total youth registration on the MY Bharat portal stands at more than 1.9 crore.

A New Democratic Tradition

What makes VBLYD different from conventional youth events is that it is not a one-day celebration. It is a continuous process, a democratic tradition in the making. At each stage, the ideas of young Indians are gathered, curated, and brought into dialogue with policymakers. This ensures that the dialogue is not symbolic, but substantive.

For decades, young people across the world have yearned for their voices to influence decision-making. VBLYD is translating this dream into ground reality in our country. It is, in every sense, a youth-led democracy in action.

Mirroring the Diversity of Bharat

One of the greatest strengths of VBLYD is its rootedness in India's diversity. At the district level, competitions capture local insights. At the state level, these insights merge into regional perspectives. At the national level, they come together to form a tapestry of ideas that reflect the richness of Bharat itself.

Consider this: a young farmer's daughter in Vidarbha may propose innovations in irrigation, while a coder in Bengaluru imagines an AI-driven health solution. Both are equally valid contributions to the vision of Viksit Bharat, and both find their place at VBLYD. When such diversity converges, innovation flourishes.

Take the Quiz, Lead the Change

Registrations for the Viksit Bharat Quiz, originally open until 15 October 2025 on the MY Bharat and MyGov portals, have now been extended till 31 October 2025. The quiz has seen an incredible response, with participation from over 20 lakh young people. I urge every young Indian—whether you are in school, college, or the early stages of your career—to participate. Do not see this as just a competition. See it as your chance to contribute to the nation's journey. Each answer you select, each idea you propose, is a step towards building Bharat as you wish to see it.

The dream of a developed India cannot be realised by the government alone. It requires the imagination, energy, and leadership of our youth. The Viksit Bharat Young Leaders Dialogue provides the pathway; the quiz is the starting point.

Views expressed are personal

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John J. Kennedy



How to turn 'wall' over America's student visas into India's advantage

For decades, an American student visa symbolised entry into an aspirational world of ideas, opportunity and mobility. For middle-class families across India, China and much of the Global South, the passport stamp provided their children access to the global commons of research, networks and careers. That promise is now fraying.

According to Statista, Consular by rights data released in September 2023, the first half of fiscal 2023 saw a 14.7 per cent decline in F-1 student visas. The fall has been steeper: India suffered a staggering 45.5 per cent decline, while China saw a 24.1 per cent drop. These figures indicate a new phase in America's relationship with international students: one increasingly defined by suspicion.

Several Indian students have recently had their US visa applications rejected. The rejections, often citing "insufficient ties to India", have coincided with Washington's expanded social media screening and digital vetting procedures, which now require applicants to share all public handles. Many, including students like Kanchik Rishi, suspect that posts critical of India's treatment of minorities or US foreign policy trig-

gered their rejection. Some who had voiced support for pro-Palestine protests were even deported or had visas revoked for alleged "activities counter to US national interests".

Three other Indian students interviewed by the Washington Post shared similar experiences. The result is a growing fear that free expression online can now jeopardise educational mobility. A critical essay, joke, or even loose talk in activities over several years of preparation. For Indian and Chinese students, the largest contributors to America's STEM pipeline, the message is clear: Sussess, dissent or stay away.

The implications are far-reaching. International students have long been vital for America's higher education. They make up nearly 40 per cent of all graduate enrolments in STEM and exceed 50 per cent in some doctoral programmes. Indian students alone number around 2.5 lakh, while Chinese students contribute another 1.8 lakh. In 2023, their presence added an estimated \$8 billion to the US economy and supported 1.35 lakh domestic jobs. Restricting these inflows can directly sap the vitality of US universities. Studies show that a 10 per cent increase

in foreign graduate students boosts patent activity by about 5.7 per cent. Fewer students result in slower innovation. Already, smaller public universities are reporting budget shortfalls as applications decline.

Many nations are now strategically positioning themselves to capitalise on this shift. Canada issued a record 5.5 lakh new study permits in 2023, leveraging streamlined pathways to permanent residency. Britain has overtaken the US as the leading destination for Chinese students, while Germany and the Netherlands are rapidly expanding English-medium programmes. Australia, long overshadowed, has rebounded with simpler visa procedures. Even China has entered the competition, launching its "K visa" offering clear residency pathways and world-class labs. These nations have recognised that attracting young talent is not charity, but an investment in economic and intellectual power. By contrast, America risks weakening its competitiveness in vital fields, such as AI, biotechnology and quantum computing, which rely on global collaboration.

For India, this moment is not merely about watching America shrivel. US

education has historically seeded India's entrepreneurial and scientific ecosystems, bolstering the IT boom. Alumni returning from American campuses brought technical expertise, networks and credibility. A steep decline in student mobility now threatens to break these cycles. But it is in this context that India must resist a purely reactive stance. India cannot simply lament America's retreat from openness; it must seize this moment, as other nations have, to rethink its higher education strategy. Three priorities are urgent.

First, India must strengthen its own universities, particularly public ones. Quality cannot remain the preserve of a handful of IITs or IISRs. If the US is retreating across, India should expand its own investments in research infrastructure and international accreditation. The National Education Policy's vision of globalised campuses will remain aspirational unless backed by sustained funding and reforms.

Second, India must diversify partnerships. Europe and East Asia are actively seeking global talent, and India should negotiate deeper, rights-based agreements with them, such as joint degree programmes, simplified credit transfers

and transparent visa regimes. Bilateral education pacts, modelled after trade agreements, could provide Indian students with a more predictable pathway while attracting foreign faculty and researchers to Indian campuses.

Third, India must invest in creating its own global talent. If knowledge is the new currency of power, attracting students from Africa, Southeast Asia and Latin America should be part of India's strategic play. A regional hub model, where Indian universities host centres of excellence in STEM, climate studies or public health, would both internationalise Indian higher education and generate diplomatic goodwill.

For India, the way forward is to recognise that student migration is not merely about individual ambition, but national policy choices. Washington's choice today may be suspicion and surveillance. India's choice should be openness, investment and self-confidence. Only then can we turn the current crisis into an opportunity.

The author is retired professor and former dean of the School of Arts and Humanities at Christ University in Bangalore.

Aaj

'NEP will completely transform education sector'

Face to Face

PRASANTA J BARUAH
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Educationist Prof Kiran Hazarika says that the National Education Policy, 2020 is student-centric and a holistic policy with equity and inclusive education.

Prof Kiran Hazarika is Pro-Vice Chancellor at Central University of Punjab. A former Pro-Vice Chancellor of Indra Gandhi National Open University, he has over 30 years of experience in the education sector.

How do you view the development of the education policy in India and how has the Narendra Modi government fine-tuned it for the future needs of the country?

The Second Education Policy 1986 was introduced by the then Congress-led government and it was implemented in 1992. In 2014, when Narendra Modi became the Prime Minister of India, he took up the vision of transformation in education and under the chairmanship of Dr Kasturirangan, a draft committee for a visionary National Education Policy (NEP) was formed for bringing changes in education. It was presented to the government in 2019, and on August 29, 2020, it was officially announced and implemented. The NEP 2020 is completely student-centric and based on Indianness in education. It includes Indian knowledge tradition in the curriculum, mother tongue-based education, and is a holistic policy with equity and inclusive education. It promotes quality in education, and implementation of early child care education. It also focuses on the 5+3+3+4 structure (education system from pre-primary to senior secondary), credit transfer system, four-year undergraduate programme, integrated graduate and postgraduate programmes, digitalisation of education, etc.

How is the Indian education system being digitalised?

With the objective of complete digitalisation of the education system through 'One Nation, One Education' in a country of 1.4 billion people, the goal is to ensure equal curriculum, resources, and opportunities with quality education for all. Today,

SWAYAM has become the world's largest education portal with 4.4 million daily accesses. Even during the Covid period, PM e-Vidya, e-PG Pathshala, Swayam Prabha, Swayam+, National Digital Library, Shodh Sindhu, Vidvan, etc., were launched. Under 'One Nation One Student ID', APAAR (Automated Permanent Academic Account Registry) has registered a total of 315 million students. Along with this, DigiLocker and Academic Bank of Credit (ABC) have been implemented as part of the student life cycle, where 2,500 institutions have actively participated.

How has the Budget provisions kept pace with the ambitious schemes of the Modi government in the education sector?

Today, a provision of Rs 1,28,650 crore has been made in the education budget, which is 4.6 per cent of the Gross Domestic Product (GDP), with the resolve to take it up to 6 per cent of the GDP - with the Department of Higher Education receiving Rs 50,078 crore, and Rs 78,572 crore being allotted for school education, as well as making provisions of Rs 500 crore for AI initiative in higher education, and Rs 300 crore for Bharatiya Bhasha Pustak Scheme under which three lakh books will be published in regional languages. These books will be digitally provided to readers.

What is the objective behind the establishment of PM Shri schools?

Under this scheme, in accordance with the NEP, out of the target to develop 14,500 schools as model educational institutions, 12,079 schools have been approved and developed so far. Here, emphasis has been laid on critical thinking; holistic development, integrated perspective, community engagement, and stimulating learning environment by integrating methods such as experiential play-based learning as well as 21st century skills.

What research and innovation initiatives have been taken up by the gov-



ernment to foster the Indian value system and culture?

The NEP fosters research and innovation by establishing Anusandhan National Research Foundation (ANRF) to provide research fund for merit-based, high quality, interdisciplinary research, robust industry-academic linkages to support startups and cultural innovation. For the ANRF, a provision of Rs 50,000 crore has been made in the 2025-26 Budget, but the government will keep a fund of up to Rs 1 lakh crore, through which research institutions will get support for fundamental and innovation-based research fund.

What initiatives have been taken by the government to establish chartered institutions in India?

At present, in India we have 1,250 universities and 45,000 colleges with nearly 11,000 standalone institutions. In 2013, there were only 16 IITs, 13 IIMs, and 7 AIIMS. In contrast, the Modi government established a total of 23 IITs, 23 IIMs, and 26 AIIMS across the country, thereby increasing the growth rate of institutions. Along with this, quality institutions like IITs and some universities are today leading in the National Institutional Ranking Framework (NIRF) rankings and in research publications.

What are the provisions of mother tongue or medium of study in NEP and what initiatives have been taken by the Modi government?

Under the NEP, the Modi government is taking the initiative of teaching and encouraging mother tongue not only in school education but also in higher education such as engineering, science, and medical studies. Under UGC, work has started with the support of the Indian Language Committee to prepare 3.49 lakh courses in Indian languages. All State governments have been advised to use mother language as medium of instruction. The three-language formula is also being implemented all over the country.

How is the government promoting skill and entrepreneurship education?

Under the NEP, skill education has been included in the curriculum from class 6 onwards with certification, internship in class 8, and skill certification up to class 12. In higher education, B-Voc and M-Voc courses have been implemented in all colleges and universities, leading to the development of employment, self-entrepreneurship, and startups.

As we have the largest number of institutions, students, teachers, so without proper training we can't achieve our goal. What initiatives have been taken for training of students and teachers?

The Modi government has created online platforms like Dikshasrambh for students and NIPUN Bharat, Vidya Pravesh, DIKSHA, NISHTHA, NDER for teachers. Other than these platforms, the government has established Madan Mohan Malaviya Teacher Training Centres and Integrated Teacher Education programmes approved for designated institutions by NCTE based on the NEP. In this way, the Modi government is implementing hundreds of schemes, which will be helpful in achieving the goal of Viksit Bharat 2047.

Breaking to build: What the Nobel for economics tells India

ILLUSIONS
AND
DELUSIONS



TCA Ranganathan
The former chairman of the Export Import Bank of India is a banker with a theory of everything
@starcra

This year's Nobel Prize in Economics may help us in India resolve a long-standing paradox: how can a country be a global growth leader and yet remain a manufacturing underachiever? India is indisputably one of the world's fastest-growing economies. Our services sector is booming. Digital gladiators are thriving. Financial and real estate markets are vibrant. And yet, in manufacturing – the job-rich, export-driven engine of transformation that most covet the prize – we continue to punch much below our weight.

The 2025 Nobel, awarded to Philippe Aghion, Peter Howitt, and Jod Mylot, celebrates the disruptive force of "creative destruction" – the process by which innovation topples old industries and clears the way for new ones. It's messy. It's painful. It destroys before it creates. But it is essential for progress. It asks us to ponder: why the continual churn of creative destruction fuels manufacturing growth. What kind of environment allowed it to flourish? And why hasn't India built one?

Karip Schumpeter famously described cre-

ative destruction as capitalism's secret weapon. But capitalism, as Adam Smith warned, is not always benign. In *The Wealth of Nations*, he observed: "People of the same trade seldom meet together... but the conversation ends in a conspiracy against the public." Entrepreneurs thrive when they are close to power – not always with an intent to corrupt, but close enough to whisper. Also, in small countries like Japan or South Korea, a few national champions may suffice for manufacturing success. But in vast nations like China or India, success demands creating many more champions. But then arises the risk that these cronies may exploit, conspire, or even harm.

The irony is striking, as creative destruction and manufacturing to thrive. Deng Xiaoping undermined this paradox. He saw that entrepreneurial energy could be harnessed – even within a socialist system – if competition was encouraged and economic power was decentralised. The trick is to make cronyism competitive, not corrupt. Thus, Deng rebuked socialists after Mao. By giving China's 900+

cities control over land, investment, and industrial policy, he created a competitive ecosystem where local governments chased their own champions. Over half of China's public spending is managed locally, in a system of "competitive cronyism", where multiple local governments, competing with each other, can nurture their own industrial advantages. It thus needs understanding that it is the economic structure, not ideology, that determines success. Centralised control stifles innovation and creative destruction. Decentralised competition fuels it.

The results are staggering. China has overwhelding global manufacturing dominance and a near choke-hold over a variety of new-age high-tech sectors, including chips, EVs, robotics, battery manufacturing, and AI, many backed by the local/provincial governments. We, on the other hand, are not able to reduce our import dependence on them despite the uncomfortable diplomatic relations.

Deng's genius was to create multiple centres of power. Each city has its own industrial

ambitions, champions, and incentives. This fragmented patronage system has accelerated innovation. Cronyism became a tool for experimentation, not stagnation or exploitation.

India has a federal structure, but not the locally available fiscal muscle. While state governments do control around 80-90% of public expenditure, most, if not all, of them are giant-sized themselves, far larger in population and geographical size than most poor countries. We have only a small number of urban bodies, and most are financially dependent on state capitals, with limited authority to shape industrial ecosystems. The result is that while the services and construction/real estate sectors undoubtedly flourish, as do low-risk manufacturing like paints/wires and cables, the higher-risk, longer-gestation technological manufacturing does not.

Industrial R&D and venture experimentation are low. And then, there's the matter of dealing with business failure. If creative destruction is the engine of innovation, local entry law is the shock absorber. Here, India and

the US are opposites. In the US, bankruptcy is a second chance. Entrepreneurs who fail aren't criminalised; they're often celebrated. In India, default can trigger liquidation and criminal liability. The stigma of failure lingers long after the books are closed. This matters. Entrepreneurs take risks. They cut corners. Sometimes, they fail. If the system punishes failure too harshly, it stifles the very spirit of creative destruction this year's Nobel celebrates.

We have the ingredients: a federal structure, entrepreneurial energy, and a hunger for growth. What we lack is the enabling architecture – fiscal decentralisation, empowered cities, and performance-linked incentives for local officials and a way to handle business failure.

If we want our own gale of creative destruction, we must build the wind tunnels. Adam Smith warned us that businessmen conspire. Schumpeter told us capitalism survives by destroying itself. Deng showed us socialism can do the same, if it decentralises wisely. We must now reflect: do we continue to fear the gale, or now start learning how to ride it?

Indrani Banerjee



Knowledge vital to development: Does India fit the Mokyr bill?

Capitalism, the most enduring economic system in history, is believed to have been superseded by conditions conducive to the unbridled accumulation of private capital and the pursuit of profit. The ascent of private capital beyond a tipping point is said to have created the fundamental conditions for an explosion in private enterprise, ushering in the age of capitalism.

Economic historian Joel Mokyr, while teaching and studying Britain's Industrial Revolution which marked the beginning of the capitalist era, began seeing things in a somewhat different light. He suspected the secret success of the capitalist recipe is not just capital or the spirit of enterprise but a specific type of knowledge system.

In his much-acclaimed book *The Gift of Athena: Historical Origins of the Knowledge Economy* (2002), he postulated that useful knowledge could be categorised into two types: "Propositional Knowledge", the scientific understanding of the natural world, and "Prescriptive Knowledge", the practical techniques that derive from a scientific understanding of the world and how things work.

His theory claims that before the Industrial Revolution, practical knowledge often advanced without a corresponding scientific understanding of underlying processes and phenomena. This, according to him, eventually stopped innovation and growth, or at best allowed them to flit and startle, and not in a sustained way essential to economic transformation.

Mokyr argues that not only is knowledge a vital

condition for economic take-off but it is also essential there is a knowledge culture that fosters learning and experimentation in practical matters. This emphasis on the role of knowledge in economic development is not entirely novel, but Mokyr takes it to another level by specifying the conditions necessary for the successful operation of knowledge systems and how it is self-sustaining. These ideas were his the 2025 Nobel Prize for Economics (along with two others).

Mokyr's postulates have enormous relevance for India which is on its way to become the world's third largest economy and yet continues to struggle to break out of underdevelopment and low living standards. It is useful to see how conditions in India stack up against his ideas.

First of all, he demonstrated that if innovations are to become part of a self-perpetuating process, not a one-off phenomenon, it is not only necessary to know how something works but to also need to have scientific explanations for why it works in that manner. This notion is alien to most Indians, who view "jugaad" as the best way to doing things. But "jugaad" isn't really a system. It doesn't tell us what is wrong and what is the nature and nature of the problem. It doesn't provide any systematic or scientific explanation for something that works or why it fails.

Second, Intellectual Property Rights (IPRs), according to Mokyr, were crucial in fostering the knowledge environment and technological progress by making inventions lucrative. In India, IPRs haven't traditionally been enforced strictly, and inventions

are rarely great successes. However, of late the number of patents issued in this country is rising, though their quality is said to be low and IPR protection remains weak, due mainly to the poor state of India's judicial system.

Most important perhaps is Mokyr's emphasis on the need for society to be open to new ideas and change. Here too, India does not score high. Indians are weighed down by traditions, obscurantism and traditional ways of doing things. There is great resistance to learning, especially at the worker level.

Nobel Prize-winning economist Amartya Sen was pessimistic about India's prospects for emerging as a developed country. In a 2005 interview to the London School of Economics, he said "India is the only country in the world which is trying to become a global economic power with an uneducated and unskilled labour force. It's never been done before, and never will be done in the future either. There is a reason why Europe went for universal education, and so did America, Japan, after the Meiji restoration in 1868, wanted to get fully literate in six years and they did. So did South Korea after the war, and Taiwan, Hong Kong, Singapore and China." He blamed the Indian government for not paying sufficient attention to basic education for all or addressing the problems of the quality of human labour.

Sen is correct about the quality of the country's working classes as a whole, who are either uneducated or poorly educated, extremely resistant to learning and adopting new work methods. At the

other end of the socio-economic spectrum is India's big business class, the people with money and means to use knowledge and technology to carry the country and country forward. But here too the results have been disappointing. Indian business is dominated by specific caste groups whose forte is and has always been finance, at which they are confident, but not in innovation.

The silver lining is the burgeoning Indian middle class, which is better educated today than it ever was and has shown ample innovative tendencies. A large number of successful start-ups point to their dynamism. It is not surprising that it took a business outsider, a middle-class person like N.R. Narayana Murthy, to use innovation and knowledge to lead into the country's top corporate enterprises. He remains an exception currently but the way things are progressing India will likely witness a corporate landscape dominated by innovative tech entrepreneurs rising from the middle classes.

Former President A.P.J. Abdul Kalam, in his 2005 address to the National Knowledge Commission, had foretold: "The aspiration to transform India into a developed nation can only be realised if we evolve into a knowledge society. Knowledge is the primary source of wealth creation and social well-being in the twenty-first century." Two decades later we are still struggling with that task.

The writer is an independent commentator on political and security issues.

From access to enablement: Elevating the role of incubators

SRINIVAS UPPALURI

A recent conversation with a representative from a national incubator network offered a quiet but important insight. During a discussion about a potential crisis about go-to-market strategy and marketing for artificial intelligence startups, a direct question was raised: how does the network define success for the startups it supports?

The response was clear and honest: "We create mentors, bootcamps, networking. The startups decide what to leverage. We don't specifically focus on maturity outcomes."

This perspective is not uncommon. Across many programmes, the dominant narrative revolves around access—to mentors, customers, investors, and government platforms. For example, a recent incubation programme invitation promised: "What founders will get: Access to pilots, customers, K1 mentorship, connects with large number of funds and ecosystem partners."

Such offerings are undeniably valuable. However, by design, they are enablers, not outcomes. The underlying assumption is that if access is provided, startups will know

how to convert opportunities into value. In reality, many struggle—not because of lack of ability, but because they are still at early stages of development and learning to make the most of available opportunities.

Startups today navigate increasingly complex terrain marked by shifting technologies, evolving customer expectations, and heightened investor scrutiny. In this context, maturity is not merely a function of time or traction; it depends on strategic clarity and organisational depth.

This is precisely where incubators and accelerators can make a significant difference. Their role extends beyond merely opening doors; they have the opportunity to prepare startups to walk through those doors with confidence and clarity.

Perspectives on startup maturity

To support this journey, maturity must be viewed as a multi-dimensional construct. An overview of the maturity focus is provided in the adjacent table. A maturity matrix (see table) can serve as a tool for startups to self-assess and identify gaps, and shift focus from short-term fixes to sustained progress. The assessment process is rigorous and should be revisited at

Dimension	Focus of Maturity
Markets & Customers	Strategy, fit, wallet share logic, stakeholder alignment
Products & Services	Customer ownership, leverage readiness, ecosystem delivery
Operational Processes	Scalable systems, tech enablement, institutional ways of working
People & Leadership	Current capabilities + future readiness, leadership for scaling
Technology - Product	Proven/ing relevance, applicability, industry setting approaches
Technology - Management	IT/digital aligned with business strategy and decision cycles
Business Model	Revenue architecture, risk logic, breakeven and share model logic
Strategic Outlook - All	Alignment across vision, mission, strategy, Explore lenses

various stages of evolution.

Most incubation programmes already offer a vibrant array of support: mentorship, demo days, bootcamps on fundraising, networking with venture capitalists, and corporate. While each adds value, their true impact emerges when they are woven into a structured capability-building journey. Founders need more than visibility or exposure—they need structured reflection, clarity on what to build next, and an environment that challenges them to think

beyond the immediate and the urgent.

Balancing autonomy and structure

Within the startup ecosystem, it is widely believed that founders know best and should choose the interventions they need. This autonomy is crucial, but structure and reflection are not constraints on autonomy—they are tools to enhance it.

In addition to seeing startups go for marketing bootcamps when their real challenge lies in product readiness, or to prioritise in-

vestor meetings before developing a clear stakeholder map. By adopting a maturity-first approach, founders can make choices based on insight rather than instinct.

The role of the incubator, therefore, is not to prescribe a rigid path. Instead, it is to serve as a mirror—offering frameworks, feedback, and focused interventions that help each founder shape their own evolution. Incubators have already played a pivotal role in catalysing India's startup ecosystem. The next stage of impact, however, lies not in exposure, but in deepening engagement and support.

The shift involves moving:

- From events to structured journeys
- From access to capability
- From celebrating pitches to building resilient business models
- From transactional support to long-term partnership

A maturity lens enables programmes to adapt, personalise, and elevate their impact—while preserving the agility that allows startups to thrive.

When incubators transition from simply providing access to fostering enablement, the value they create compounds—benefiting founders, sectors, and the

broader ecosystem.

Ultimately, what matters is not merely who founders connect with, but how prepared they are when those connections happen. True startup readiness transcends maturity across multiple dimensions, including:

- A well-defined market and customer focus, aligned with strategic fit and timing
- Product and service readiness that enables full customer value realisation
- Operational processes that are institutionalised, scalable, and strategic
- Leadership and talent teams balancing current execution with future readiness
- Technological capabilities strategically leveraged in both product and operations
- Business models grounded in sound financial logic, risk allocation, and scalability planning
- The ability to think and act across time horizons—earning today, enabling future growth, and exploring disruptions

Incubators have a pivotal opportunity to support startups across these areas—not merely providing access, but by actively enabling maturity and long-term success.

(The author is an author and leadership coach)

Noble thoughts, novel realities

China, and not Americans, or other westerners, deserved the Nobel Prize (economics) in 2025. Before we venture into this bizarre journey, or espouse on such disbeliefs, we say China, as a nation, and Americans, as individuals. Keep this distinction in mind as you read on. I have sound economic logic to back up my assertion. Let us first dispense with the formalities. The Nobel Prize in economics went to Joel Mokyr (Northwestern University), who got 50 per cent of the prize money, and Philippe Aghion (Collège de France) and John Hewitt (Brown University), who shared the other half.

The trio proved or demonstrated that capitalism is indeed the most superior form of economic organisation. They identified innovation, knowledge, sustained gathering of knowledge, and what is called the process of creative destruction and regeneration as the reasons for sustained growth and prosperity. Mokyr talks about the importance of tech to generate development, growth, and prosperity. The other two used historical data to state that creative destruction is important for new forces of technology to emerge in an economy.

Creative destruction instantly reminds me of the famous Joseph Schumpeter, who coined the term in the 1920s and 1930s. That was when such terms were not popular or considered to be hip. Right now, in this era of AI-driven innovation and rapid tech advancement, it seems natural that the emphasis on disruption, and creative destruction finds a pride of place in any economic discourse. Along with this, what the three economists argued, though it was not highlighted in the mainstream media, was the need for other crucial ingredients such as political free speech, dissent, and democracy.

When I read the details, and did more reading, there was an issue that struck me. If democracy, dissent, free will, and free speech are indeed important economic tools, where does China fit into this Nobel Prize-winning picture? Even a schoolchild knows that the country broke, and continues to break, these norms in a sustained manner. Virtually every

Chinese company, which has become a global behemoth, has received active support from the State.

Virtually every major CEO, entrepreneur, property developer, or businessman of any stature is either a member of China's Communist Party, or has close familial ties with it. If nothing she or he needs to be a public supporter of the communist system and regime. Of course, there is no question of free speech, dissent, or democracy in the way it is understood in the Western Hemisphere.

Way back in 1989, there was a violent protest by pro-democracy students in China, which was perhaps inspired by similar events in neighbouring South Korea. The Chinese movement fizzled out because the State and military cracked down ruthlessly at Tiananmen Square. That was when China was emerging as a fast-growing economy, which favoured a unique model. It was a state-controlled one, where political curbs were rampant, and politics and party drove a state-led capitalist model of development.

There were many analysts in the late 1980s and early 1990s who suggested that this kind of military crackdown, and violations of human rights would lead to vanishing foreign investment. During the 1980s, the Red Dragon had begun to woo foreign capital. We know that nothing of this sort happened. In fact, China is today the second largest economy in the world, with a GDP of \$19 trillion. Not just this. China has absolutely excelled in innovation, technology, and every other sphere that matters in this age of AI and robotics.

Look at the kind of products it makes, and patents it holds. China rivals the chip-makers in the United States and Europe. The former is possibly ahead of the West when it comes to electric vehicles and batteries. Remember, BYD, which was a tiny, low-cost, low-productivity, low-quality battery-making company three decades ago, has replaced Tesla as the top electric car company in the world.

There are several other instances. China is unique in that it has created an entire tech and IT ecosystem, without dependence on either the United States, or its companies and behemoths such as Google, Apple, Microsoft, IBM, or Facebook. How did China achieve this? This remains a mystery, if the current Nobel Prize winners are to be believed. In China, innovation is clearly visible.

Anyone who has visited China will possibly agree that the state of infrastructure, technological development, and the way its citizens lead their lives is arguably superior compared to most nations. There are problems, but the same exists everywhere. So, are the three Nobel winners wrong? Not really. As they maintain, progress requires technology, disruption, and creative destruction. But one is not sure if politics, and western mode of politics, are essential ingredients.

According to a recent study, China's "rapid innovation progress stems from the Chinese Communist Party's determined effort to dominate global markets in a host of advanced industries." Hence, the State, not democracy and openness, can drive tech-led growth. A model of "National Power Capitalism," or capitalism forced by nationalist sentiments, can outweigh existential competition in democracies. The State can be an enabler, and behave like a visible hand of markets to outsmart the invisible hand of the markets.

"While China is ruled by a communist party, China is not the Soviet Union, and its firms have a considerable degree of freedom to act... (if) they are working to achieve the goal of making China the world innovation leader. The reality is that China is much more akin to where the Asian tigers (Hong Kong, South Korea, Singapore, and Taiwan) were 20 years ago, only in this case, China is not a tiger, but rather a fire-breathing dragon on government-supported steroids," states the report. It is time to accept that China can innovate.

If China climbs the innovation ladder, and competes with the West, there are implications both for China and the western world. "First, it would mean that China would be much more self-sufficient in advanced industries, and much less vulnerable to western sanctions, and other trade tools used in an attempt to discipline China. At the same time, it would also boost Chinese military capabilities even more, as civil-military fusion becomes stronger, and weapons systems companies could rely on cutting-edge technologies across a range of industries. Just as importantly, this commercial technology strength would also equate to increased power in foreign affairs, just as America dominated the world for more than half a century after WWII, as its firms were the unalloyed leaders. It is China that might decide to impose export controls on the allied nations as punishment," adds the same report. China may be the next tech-driven, innovation-enmeshed, and progress-led superpower.

The author has worked for leading media houses, authored two books, and is now Executive Director, C Vener Foundation.

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The Pioneer
SINCE 1969

OUR TAKE



Sutanu Guru

Author, Journalist
and Academician



Cities learning to think, but for whom?



ROHAN KUMAR

On a humid evening in Singapore, a stretch of road clear of traffic without a single policeman intervening, lanes beneath the ground where congestion forcing a driver to jockey and merge vehicles before the jam materialises. In Seoul, a water-filled pothole leaks hot oil before a drop is hot. These are not glimpses of a distant future. They are signs of how Indian cities are beginning to evolve into parking systems.

Before the end of this century, the most powerful and complex form of intelligence on earth may not be biological or robotic. It will not walk or breathe. It will be something larger and more

diffuse spread to their environment. As a physicist, I see this not as a metaphor but as a real turning point: cities are changing from passive places we live in into active ones that evolve and think alongside us.

India's Smart Cities Mission, launched in 2015, was an important first step — bringing digital tools into public services and governance. But the next stage will be more demanding. Building "thinking" cities will require artificial intelligence to be woven into every layer of infrastructure, planning and policymaking, along with strong systems to guide and ensure how this intelligence is used.

The Physical Foundations of Urban Intelligence: Intelligence is always rooted in the physical world — in energy, water,



diffuse but critical. What were once physical spaces for human activity are becoming living networks that sense, learn and act. Driven by data, algorithms and sensors, cities are starting to function like giant neural networks. They will not simply respond to instructions — they will anticipate needs, adapt autonomously and influence decisions. They could prevent traffic jams before they occur, balance energy use dynamically, detect disease outbreaks in advance and even help shape public policy in real time.

This transformation is not merely technological. It is political, economic and cultural.

The decisions made today will determine what these new urban intelligences become — whether they enhance human freedom or constrain it, whether they distribute opportunities or entrench inequality, whether they strengthen democracy or enable authoritarian control.

From "Smart" to "Thinking" Cities:

The shift from basic digital infrastructure to real intelligence has already begun. In Hangzhou, China, an AI system called City Brain cut traffic jams by predicting where congestion was about to happen and changing traffic signals automatically. The result was dramatic — the city fell from being the 37th most congested in China to 15th — seventh.

In Singapore, a project called "Virtual Singapore" has created a complete digital version of the city that helps planners test policies for energy, disaster response and transportation before they are rolled out. Even Qayyidat in Toronto — a bold bet called "experiment" — showed what a future city could look like if machine learning guided building, transport and utilities from the ground up.

Two decades ago, a "smart city" meant a city that could react to data — adjusting traffic lights or tracking water leaks. What is coming now is much deeper, a "thinking city" that learns from data and uses its own processing power for autonomous systems.

The movement of water, power and vehicles follows the same physical laws that govern heat and things as constant look like and adaptation become the way lives

compiling power and human talent. The new intelligence of cities is not different. A single hyperscale data centre, the "brain" of an AI city, can use over 100 megawatts of electricity — as much as a mid-sized town — and millions of litres of water each day for cooling.

The International Energy Agency warns that global data centres could consume more than 345 terawatt-hours of power annually by 2030, nearly double today's levels, driven largely by AI. In the United States, AI-focused data capacity is expected to grow thirty-fold by 2030.

India is part of this surge. Its data centre capacity is projected to rise from about \$100 billion in 2023 to over \$100 billion by 2030, with major hubs in Hyderabad, Chennai and New Mumbai. But these hubs will also strain electricity, water and land. Some already consume up to 70 million litres of water a day. If cities ignore these limits, they risk creating new crises even as they try to solve old ones.

Human capital is just as vital. Even the most advanced AI systems depend on skilled people to design, govern and question them. By 2030, global demand for AI professionals will far exceed supply.

India's demographic advantage will vanish unless without heavy investment in education, research, and innovation ecosystems. Without this, nations could become dependent on foreign technology — a new form of digital dependence that threatens sovereignty.

Governing Cities That Think

The political stakes are immense. Thinking cities will generate unprecedented volumes of data on how people move, work, shop and live.

This data can enable more efficient services, targeted welfare delivery, and early detection of disaster. It can also enable pervasive surveillance, algorithmic discrimination and political manipulation. The same systems that optimise bus routes can be used to monitor dissent.

This is a thought-provoking article written by Rohan Kumar.

Please read the complete article online at www.pioneernews.com

9/10/25

How teachers can make use of Artificial Intelligence

DARSHAN RIM

Artificial intelligence is rapidly transforming classrooms, lesson plans, and even homework. From auto-grading tools to AI tutors that can explain complex topics in seconds, technology's presence in education is undeniable. Students today can ask chatbots to summarise lessons, write essays, or solve mathematics problems within minutes. Digital tools have become quiet companions in study rooms across the country.

Naturally, a question arises: In this AI-driven era, do we still need teachers? The question may seem premature, but it captures a real tension in India's education landscape. As both the government and private institutions promote digital learning, the traditional role of teachers is undergoing a significant shift. Blackboards are being replaced by smart screens, handwritten assignments by digital submissions, and classroom discussions by online forums. Yet, before accepting technology as the new guru, it's worth asking whether machines can truly replace the human touch that gives education its meaning.

The promise of AI

AI has brought remarkable innovations to education. Intelligent learning platforms can now adjust lessons according to each student's pace and level of understanding. They can instantly evaluate responses, point out mistakes, and recommend follow-up exercises. For students, this means instant feedback and a personal

ised learning path.

For overworked teachers handling large classes, AI can be a powerful ally. It can perform repetitive administrative tasks such as grading papers, generating worksheets, maintaining attendance records, and analysing performance data, thereby reducing the burden of routine work. Teachers can devote more time to creative instruction, individual attention, and classroom interaction.

In regions facing teacher shortages—especially in remote and rural areas—AI can make education more accessible. Recorded lectures, adaptive learning modules, and voice-assisted lessons can reach students who might otherwise have no access to trained educators. In this sense, the promise of AI is not just convenience; it represents inclusion, offering a bridge to those who might otherwise be left behind.

Still, the use of AI must be guided by human wisdom. Technology should act as a tool that supports education, not a substitute for it. Without thoughtful implementation, learning risks becoming mechanical—losing the curiosity and creativity that make it meaningful.

Beyond the screen

Teaching is far more than the delivery of information. A teacher is not merely a provider of facts but a mentor, motivator, and moral guide. No algorithm can sense hesitation in a student's voice, comfort an anxious learner, or celebrate the small victories that build confidence. Education is a deeply human process, built on relationships of trust, empathy, and

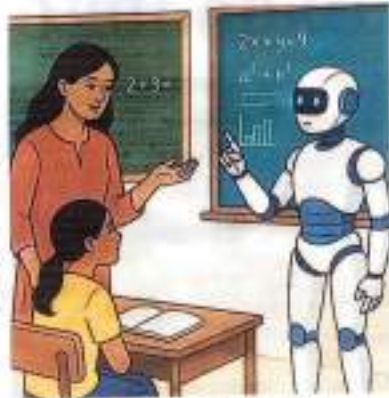
encouragement.

In India's diverse classrooms—shaped by multiple languages, cultures, and social realities—this human connection is indispensable. Teachers understand the emotional and social challenges their students face, from economic hardship to family pressures. They adapt their methods accordingly, ensuring every child feels seen and capable. A machine, no matter how advanced, cannot replicate this sensitivity.

Indian education has long valued the idea of the guru—a figure who not only imparts knowledge but shapes character. A teacher's role extends beyond textbooks, nurturing curiosity, moral understanding, and critical thinking. Machines may deliver accurate answers, but they cannot cultivate compassion, creativity, or wisdom.

At the same time, India faces a widening digital divide. Many rural households lack reliable internet access, and numerous government schools continue to operate with limited resources. If digital tools become the primary medium of learning, students in underprivileged areas could fall further behind. Unequal access to technology risks deepening existing educational inequalities between urban and rural India.

Overdependence on AI can also make students passive consumers of informa-



tion. When machines provide ready-made solutions, the ability to think independently, reason critically, or question deeply can weaken. Teachers play a crucial role in keeping these skills alive—encouraging debate, discussion, and reflection, all of which are vital for a healthy democracy and a thriving society.

Teaching together: Humans and machines

Rather than viewing Artificial Intelligence as a rival, we should see it as a teaching

partner. AI can handle mechanical tasks like grading, attendance, and lesson planning, freeing teachers to focus on dialogue, mentorship, and higher-order thinking. When humans and machines work together, classrooms can become more efficient and engaging.

For this partnership to succeed, teacher training must evolve. Educators need to be comfortable using technology and understanding its possibilities and limits. They should be able to interpret data from digital tools, design lessons that blend human creativity with technological support, and use AI responsibly to benefit every learner. The goal is not to replace teachers with AI, but to amplify the teacher's impact through it.

Policy support is equally important. Teachers should have a say in choosing and shaping the tools they use. They must ensure that AI is implemented ethically, that student data is protected, and that technology remains a servant of education, not its master. Without human oversight, AI could unintentionally reinforce biases or reduce learning to a series of automated transactions.

AI should act as an assistant—helping teachers teach better, not teaching in their place. The combination of human wisdom

and machine efficiency can bring balance to the classroom, making education both intelligent and humane.

Human touch still matters

At the heart of education lies something no machine can replicate—the human connection. A teacher's presence brings warmth, trust, and inspiration. The look of encouragement, the gentle correction, or the shared pride in a student's success—these are experiences beyond the reach of algorithms.

AI can make learning faster and more efficient, but it cannot make it meaningful on its own. The true purpose of education is not merely to inform but to transform—to build character, curiosity, and compassion. These qualities grow only through human relationships.

As classrooms continue to evolve, the teacher's role will not disappear—it will change. The teacher of tomorrow will be less of a lecturer and more of a guide, someone who uses AI to inspire creativity, foster empathy, and sharpen critical thinking. In this digital age, India does not need fewer teachers; it needs more empowered, well-trained teachers who can combine the best of technology with the best of humanity.

When machines handle efficiency, teachers can focus on inspiring minds and hearts. That, perhaps, is the real promise of education in the AI era—not replacing humans with machines, but making humans wiser through them. (The author is a assistant professor of a management school)

DDH/21/11

Introducing creativity in classrooms to inspire future generation

JOSELYN T LOBO

The reality of the formal education system mandating our originality and creativity is well-known. In his book *Measures of Demand*, writer Mihaly Csikszentmihalyi states "Each one of us was born creative. And then, one day, we went to school." In a similar vein, Pablo Picasso, the renowned Spanish painter, remarks "Every child is an artist. The problem is how to remain an artist once he grows up." It is estimated that by the time we turn forty, most of us express less than two per cent of the creativity we demonstrated as children.

Creativity, or a creative approach to teaching and learning, is crucial in the present times. In fact, creativity is one of the Four Cs of the 21st-century learning skills, along with critical thinking, communication, and collaboration. Let us explore ways the teacher can foster a climate of creativity in her classroom and rekindle the creative spark.

Creativity is a skill that can be learned and developed with practice, like riding a bicycle or operating a computer. The teacher first needs to adopt creative teaching methodologies that appeal to the present Gen Z. Games, participatory exercises, puzzles, case studies, role-plays, simulations, and brainstorming techniques are some student-centred methods that may be explored. Some simple creativity exercises, like writing the initials of trees or the main words with the letter 'T', can be used by any teacher,

regardless of the subject being taught. (See box for more details and other exercises).

Generating new ideas

Creativity, which derives from the Latin *creare*, to make, is most often associated with the arts and culture. Creativity is the ability or process by which something new and different is created. The "something" may be either a physical object (sculpture, painting, or invention) or something intangible (a theory, idea, or melody). Creativity is the act of turning new ideas into reality. Creativity is characterised by the ability to perceive the world in new ways, to make connections between seemingly unrelated phenomena.

Creativity is for everyone, not just the talented few. It is, therefore, the prerogative of a teacher to encourage and rebuke as the spark of creativity in children.

A creative teacher can guide students to combine the two sides—the left and right brains—to multiply their creative power. We can be creative in almost anything we do—at work, at play, in business, in parenting, as well as teaching and training.

According to brain expert Tony Buzan, our brains have about 100 billion cells, each of which is directly or indirectly connected via ganglia and dendrites to approximately 20,000 other cells.

This boils down to the fact that the number of thoughts that we can think is greater than the new number of mol-



ecules in the known universe. You are a potential genius.

Some exercises on creativity

Here are some simple exercises on creativity and critical thinking that any teacher can use, regardless of the subject or topic they are teaching.

- Display a painted coffee mug, which is usually kept in a showcase, and ask students to think of multiple uses for the mug beyond drinking. Try brainstorming the multiple uses of a brick, brown paper, or a plate.
- Creativity circles: Make students draw in their notebook or prepare an A4

sheet with 12 circles the size of a 5-rupee coin. Let students draw round objects. The coin is an obvious example. Other examples may be found in the classroom, on campus, on the road outside, in natural objects, and on themselves.

- Within a specified time limit (two minutes), write down the names of trees. Count one for each answer you were able to come up with. 0-7 indicates low creativity; 8-15 average creativity, and above 15 is high.
- In two minutes, write as many words as you can with the letter 'T'. 0-5 indicates low creativity; 6-10, average; and above 10, high.

• List the number of languages spoken in India or the world in one minute. Here, speed is the criterion, as fluency is a measure of creativity.

• The 20 ideas method: Write a topic, goal, or problem at the top of a marker board and discipline your group to continue writing until you generate a minimum of 20 answers. This method can also be done individually.

Creative classroom

Myths and false beliefs about creativity abound, and a creative teacher can dispel these misconceptions by being creative in her approach and nurturing students' creativity. Some myths about creativity include: a) creativity is a gift of the few; b) one must be 'bright' to be creative; c) students need to have core skills such as literacy before they can be creative; d) creative thinking skills cannot be taught.

Creativity incorporates playfulness, curiosity, sensitivity, and independence. Creative, rather than 'creative' thinking needs to be fostered. A creative classroom:

- cultivates a climate where creative thinking flourishes constantly; encourages questioning to stimulate creativity;
- makes it clear that all ideas are valuable;
- encourages self-evaluation and collaboration self-esteem;
- makes fun a central component of the teaching/learning process;
- is organised and ordered, yet there is

the flexibility to generate ideas within the structure of teaching/learning.

Teachers are powerful role models. They can best encourage our students' creativity by being creative themselves. An encouraging teacher might say: "That's a good idea. How can we build on it? What other solutions will you go on to find now?" Throughout my over three-decade teaching and training career, my greatest and most acknowledged strength has been the use of creative methods in the classroom. Apart from the commonly used learner-centred methods like case studies, group discussions and role plays, I used a multitude of games and exercises as well as music, art, and folk material, and my award-winning thematic stamp collection 'The World at Work' showcasing the evolution of economic life from the primitive hunting stage to the modern industrial stage.

Creativity adds meaning to our life as we can enjoy more when we are involved in it. Moreover, creativity is not fixed at birth and can be learnt and enhanced at almost any age—the younger, the better. The message a teacher needs to reinforce at every available opportunity in the classroom and on campus is that all students are creative, not just the privileged few. The mantra, 'Everyone is Creative,' (The teacher is a revival agent!)

Weak enforcement of EWS mandates

NARENDRA (NIRU) SARAWGI

A widowed mother once walked into a Delhi hospital clutching her gasping six-year-old child. Desperately holding on to her EWS certificate and a threadbare hope for humane treatment, she was met with endless waiting, and ultimately a cruel, blunt refusal.

The hum of hospital corridors in India often drowns out the voices most desperate for care. Among those voices are families belonging to Economically Weaker Sections (EWS), whom the government had pledged to protect with free or subsidised treatment in hospitals built on public land. The reality, however, is one of invisible barriers and chronic neglect – where promises made in contracts and policies rarely translate into relief for those who need it most. Today, multiple audits and strictures – from the CAG, state legislatures, and even the Supreme Court – confirm that such promises have been consistently broken.

India's policy is clear: hospitals on subsidised land must provide free care to EWS/BPL patients – 10% inpatient and 25% outpatient beds. Courts, including the Supreme Court and Delhi High Court, have ruled this to be a binding legal and contractual duty, not charity. Yet compliance is abysmal. CAG audits and legislative reviews reveal rampant violations: in Delhi, only 9 of 43 hospitals complied, and one major hospital admitted just 0.2% of EWS patients. In Odisha, hospitals granted land worth Rs 46 crore failed to deliver mandated care; in Haryana, just 118 of 64,000 patients received free treatment. Maharashtra and West Bengal hospitals have similarly under-delivered, often manipulating records or diverting land.

Oversight remains toothless – monitoring is absent, penalties are rare, referral systems are ineffective, and even manda-

tory EWS displays are ignored. The Supreme Court has issued notices to errant states, but until accountability is enforced, millions remain excluded. The failure is not technical – it is a betrayal of law, trust, and conscience.

Enforcement of EWS mandates remains weak due to poor oversight, inadequate staff, and fragmented monitoring, with penalties rarely imposed. Bureaucratic inertia and insider-dominated review committees erode accountability, while overlapping agencies create coordination gaps and encourage blame-shifting. Families, often unaware of their rights, are left vulnerable as billing loopholes and verification lapses further undermine trust. Despite legal provisions and repeated Supreme Court directives, systemic failures – including lack of infrastructure, weak enforcement, and missing accountability – persist. Real reform requires robust audits, technology-driven admission tracking, strict penalties for defaulters, and transparent publication of compliance data to protect the most vulnerable.

India's EWS support now extends well beyond hospitals, rooted in landmark reforms and flagship schemes. The 103rd Constitutional Amendment mandates a 10% reservation in government jobs and education, while affordable housing projects combat urban exclusion. Ayushman Bharat PM-JAY, the world's largest health assurance scheme, covers over 50 crore people with Rs 5 lakh of annual cashless treatment in public and private hospitals. EWS families also benefit from scholarships under the Right to Education Act, food security through the NFSA, and subsidised loans.

Yet major gaps remain: private institutions receiving public land often evade EWS obligations, especially in education. True

equity demands enforceable conditions – scholarships in private schools, reserved seats in colleges, subsidised urban services, and community access at facilities built on public land. The principle is clear: any entity receiving public benefits must serve the poorest. Only strict, transparent enforcement can turn policy promises into lived reality for EWS communities.

Assam illustrates both progress and gaps in EWS care. In education, it upholds a 10% EWS quota with 92,261 admissions and a 65% fill rate in 2023-24 – among India's best, thanks to transparent oversight. Yet the reported suspension of EWS job reservations undermines mobility for low-income families. In healthcare, PM-JAY expansion coexists with compliance lapses, though schemes like Atal Amrit Abhiyan, Assam Arogya Nidhi, and Free Diagnostic Services provide vital support. With new hospitals coming up, Assam has a crucial chance to embed enforceable EWS mandates – OPD/IPD quotas, monitoring dashboards, penalties, and cancellation clauses – ensuring equity moves from rhetoric to reality.

Transforming intent into impact requires robust enforcement. Real-time digital dashboards tracking EWS admissions – linked to eligibility data – would enhance transparency and curb manipulation. Land allotment agreements and PM-JAY empanelment must carry binding triggers – automatic fines, suspension, or de-empanelment for breaches – while a centralised grievance redressal platform with audit trails empowers citizens and ensures accountability. These solutions address gaps flagged in Delhi's CAG audits and Assam's PM-JAY experience, proving both feasibility and urgency.

Resistance from private hospitals, citing

unviability, is misplaced – concessional land itself is a subsidy, and refusal to comply should mean paying market rates or relinquishing benefits. Allegations of misuse lack weight, as Aadhaar-linked tools and NFSA/Ayushman Bharat databases can authenticate beneficiaries and prevent fraud. Charity or CSR cannot substitute for binding contractual obligations. Claims that enforceability hurts viability ignore the public bargain: compliance is mandatory. Fraud cases under PM-JAY further prove the need for audits, strict penalties, and swift accountability to uphold public trust.

Effective policy design must anticipate such challenges and embed robust mechanisms to deter breaches, ensuring that public welfare obligations tied to concessional land and subsidies are honoured with integrity.

Hospitals and institutions benefiting from public concessions must lead with responsibility, not exemption. Government ministries should expand and enforce EWS mandates across sectors touched by subsidised land – healthcare, education, housing, transport, and utilities. A society is judged not by promises but by what it delivers to its most vulnerable. For millions of Indians, barriers are built not just from poverty but from indifference – a wall that must be dismantled. When hospitals shirk obligations and profit is placed above compassion, public trust becomes expendable.

The gasping child turned away at the hospital gate is not a statistic but a reminder of a broken social contract. If that trust is betrayed, the land must be reclaimed. Whether in Delhi or Assam, rhetoric must give way to rights. Enforcement is not optional – it is essential for dignity, equity, and faith in governance.

8/22/24

A Nobel for carbon capture

B K SINGH

This year's Nobel Prize in Chemistry has been awarded to Susumu Kitagawa of Kyoto University, Japan; Richard Robson of the University of Melbourne, Australia; and Omar M Yaghi of the University of California, Berkeley, US, for their pioneering work in creating metal-organic frameworks (MOFs).

MOFs have large internal cavities that allow gases and other molecules to flow in and out, making them highly versatile. Over the past few decades, laboratories worldwide have developed numerous MOFs with varied uses – from separating PFAS (per- and poly-fluoroalkyl substances) from water and delivering pharmaceuticals in the human body to trapping ethylene gas to slow fruit ripening. Researchers have even harvested water from desert air, removed poisonous air from industrial emissions, and used MOFs to break down traces of antibiotics in the environment.

Robson was inspired by the atomic structure of diamond, a rigid three-dimensional network in which each carbon atom is bonded to four others in a tetrahedral arrangement. This repeating tetrahedral unit forms a crystal lattice, creating a highly stable and durable structure with strong covalent bonds in all directions. His early experiments in 1989 produced only unstable structures that collapsed. It was in the 1990s, through the efforts of Kitagawa and Yaghi, that stable frameworks were achieved. In 1999, Yaghi created MOF-5, a highly stable material with cubic spaces. Robson later used copper (Cu⁺) ions and four-armed molecules with nitrile (CN) groups to produce spacious MOF crystals. Since then, tens of thousands of MOFs have been formed by the scientists. MOF materials have pores at the nanoscale, which are molecular traps capable of selectively capturing gases, including CO₂. They act like high-tech molecular sponges capable of selectively capturing gases such as CO₂ with remarkable efficiency.

The Nobel Committee described MOFs as materials with "unheard of properties", noting that a porous MOF weighing just two grams – roughly the size of a sugar cube – can have a surface area as large as a football field. As Olof Ramström of the Nobel Committee for Chemistry said, "A small amount of such material can be almost like Hermione's handbag in Harry Potter – it can store a huge amount of gas

in a tiny volume."

After receiving the award, Kitagawa said, "My dream is to capture air and separate air – for instance, in CO or oxygen or water – and convert this into useful materials using renewable energy."

The potential of this discovery is especially relevant in the face of increasing climate disasters. This year alone, floods and landslides have ravaged Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and the Northeastern states. Punjab saw one of its worst floods in living memory. Landslides in Sudan killed over a thousand people; in Nepal landslide debris buried the whole village, killing over a hundred. Heat waves and typhoons disrupted lives and livelihoods across the world – in the West, East and Southeast Asia. These extreme weather events are the symptoms of the 2,500 gigatons of CO₂ humanity has pumped into the atmosphere since the Industrial Revolution. The Nobel-winning innovation offers a promising way to capture this carbon from the atmosphere.

Experiments using MOFs to capture CO₂ began in 2005. In recent years, more researchers, such as Fan and Liu (2022 and 2024), have developed cobalt-based MOF photocatalysts that can convert CO₂ into renewable energy. Industrial-scale applications are now within reach, potentially transforming carbon emissions into useable fuel.

In India, MOFs based on zinc, zirconium, chromium, and iron have achieved over 90% efficiency in removing dye from wastewater. They are also being explored as photocatalysts for degrading emerging pollutants and as sensors for detecting antibiotics and heavy metals in wastewater. Several universities and research institutes in India are studying MOFs for carbon capture. While laboratory results are promising, scaling up for industrial applications remains a challenge.

As MOFs have the potential to trap poisonous gases, they could even play a role in tackling Delhi's persistent air pollution. Post-combustion carbon capture using MOFs could be deployed in power plants and heavy industries, while pre-combustion carbon capture could benefit chemical processing and synthetic fuel production. Direct air capture from ambient air, meanwhile, offers benefits for large-scale global carbon mitigation.

(The writer is a retired head of the Karnataka Forest Force)

Trump's empty boast around H-1B visa fee

True reform would have addressed the green-card backlog. But the US's message that foreign talent is expendable has reversed brain drain, which benefits India

The headlines screamed disaster. Donald Trump's \$100,000 H-1B visa fee was supposed to crush Indian dreams. Immigration lawyers sounded the alarm, the Indian media fumed, and social media erupted over the fate of Indian engineers who built America's tech future. Then came the fine print. The rule applies only to new H-1B petitions filed for people outside the US or a few status changes. It doesn't affect the hundreds of thousands already there or most renewals. In reality, it changes almost nothing. It was another Trump tactic — a policy built to roar, not to reform.

That was a relief, but also revealing. The fee turned out to be a toothless tiger, yet its roar did real damage. It showed once again that Washington has traded policymaking for performance. America's message to global talent was unmistakable: You can work here if you pay, but don't ever expect to belong. Anti-immigrant groups cheered the \$100,000 fee as a great victory, waving it like a trophy. In truth, they were celebrating an illusion — a

loud, empty gesture that fixed nothing and fooled many.

Tech companies didn't complain for long. Microsoft, Google, Amazon, and Meta can afford the cost. What mattered to them stayed untouched — the decades-long green-card backlog that keeps foreign engineers dependent, the golden handcuffs that make the system work in their favour. The H-1B visa was meant to attract talent; instead, it traps it. A worker waiting for a green card cannot easily change jobs or start a company. For many Indians, the wait can stretch beyond 50 years. The result is modern day indentured servitude — legal, efficient, and deeply profitable for employers.

These workers rarely complain because their future depends on their sponsor's goodwill. They work longer hours, accept less pay, and live with constant uncertainty. For the companies that employ them, it's the perfect setup: Skilled talent with limited freedom, ambition contained by design. That's why Big Tech keeps lobbying for more H-1Bs but never for green-card reform. Permanent residents can leave; visa holders can't. The imbalance is intentional and keeps the system full of people who can't move or compete.

Over 1.2 million immigrants are stuck in the employment-based green-card queue, most of them from India. Many have lived in the US for decades, paying taxes and driving innovation, yet remain "temporary". Their chil-

dren risk deportation when they turn 21. This new rule, like so many headline-chasing moves before it, does nothing for them. It doesn't shorten the wait or make the system fairer; it simply creates noise without progress, pretending to act while leaving the core problem untouched.

For India, though, this dysfunction has become an advantage. Washington's message that foreign talent is expendable has quietly reversed a decades-old flow of brains and ambition. Talented Indians who once built their lives around the American dream are now building their futures at home.



Vivek Wadhwa

The pandemic proved innovation no longer needs a US address. India's digital economy has reached critical mass. Bengaluru, Hyderabad, Pune, and Gurugram now offer what Silicon Valley once did — capital, mentors, talent, and global reach. Returnees and Indian-Americans like me are founding companies in India in Artificial Intelligence (AI), clean energy, and biotechnology and venture investors are following them. Every act of exclusion from Washington speeds up this shift. When the US closes doors, the world opens them.

Supporters of the Trump fee claim it protects American jobs. It doesn't. Industries that rely on high-skill workers — from chipmaking to software — are already short of talent. Raising costs or adding red tape won't create new engineers; it just sends work abroad. The geography of innovation is changing, and this policy acceler-



The pandemic proved innovation no longer needs a US address. India's digital economy has reached critical mass.

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ates it.

America's success has always come from attracting the best minds, not shutting them out. Nearly half of Fortune 500 companies were founded by immigrants or their children. Turning that pipeline into a toll road weakens the country that once led by openness — and strengthens those that still believe in merit.

Real reform would take the opposite approach. It would increase the number of employment-based green cards and perhaps tie them to home-ownership. Every skilled immigrant who buys a home could get a faster path to residence. That single step could spark an economic boom — new homes, jobs, and tax revenue. The US should also recapture unused green-card slots, remove per-country caps, and decouple legal status from employer control so that talent can move freely. These aren't radical ideas; they'd strengthen the economy and restore fairness. But that reform never comes. True change would shift power from corporations to individ-

als — from those who control visas to those who hold them.

Once America attracted the world's best by offering opportunities. Now it greets them with red tape and empty gestures. The \$100,000 fee fixed nothing. It only reminded the world that America's openness can no longer be taken for granted.

India, meanwhile, gains what America loses. Its innovators are returning with global experience, building companies that serve worldwide markets, and creating high-skill jobs at home. The country that once exported its talent is learning to keep and import it.

The Trump tactic sizzled for a month and then fell apart, like most things built for headlines. Nothing changed except the message — that in Washington, theatre has replaced thought. And in that void, India is quietly winning.

Vivek Wadhwa is CEO, Viscix Biosciences. The views expressed are personal.

NT 14

MINDSPACE

Languages Beyond Borders

As borders blur and businesses expand, learning a foreign language isn't just an academic pursuit—it's an investment in cognitive agility, career growth, and cultural understanding



MOHAMMAD JILANI

THE WRITER
TEACHES SPANISH
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Research shows that exposure to varied languages enhances mental agility, and this effect is further amplified when learners engage with new grammatical structures and writing systems

India is a country of many languages, and we often say that in every 20 kilometres we find a different dialect. With 22 scheduled languages and hundreds of dialects, the average Indian brain is already an expert in code-switching and linguistic proficiency. It offers us a wealth of knowledge and makes us proud, as nowhere in the world can we find such a diverse variety of languages and dialects.

While the need to know Hindi and English, apart from one's own regional language, is a matter of communicating with people, learning a foreign language has evolved from an academic curiosity into a strategic, business, and cultural necessity. For most Indians in today's global scenario, it has opened many doors. The world now is more interconnected than ever. Today, we can reach anywhere in the world, and if we know the language of those countries, we can easily interact with them and do business as well.

The professional landscape is rapidly globalising, and fluency in any foreign language, such as Spanish, French, German, Russian, Mandarin, Arabic, etc., gives us a crucial competitive advantage. Many multinational companies, IT firms, and global players in the travel and tourism sector operating in India now seek professionals who can communicate directly with international customers, eliminating the time-consuming process of hiring an interpreter to make each other understandable. It also builds trust among the clients. For Indian professionals, multilingual skills guarantee better job opportunities, international assignments, and a well-paid salary, making them highly valued assets compared to others who do not know any foreign languages.

Furthermore, learning a foreign language improves the cognitive ability of



Language isn't just communication—it's connection, cognition, and culture intertwined

learners. Research shows that the mental agility developed by learning a diverse linguistic environment is significantly boosted by learning new types of grammar and scripts. This enhanced cognitive flexibility improves design thinking, decision-making, and critical thinking. Learning a foreign language is not just about communication; it's about improving your overall mental abilities to better compete on the world stage. This can solidify India's position as a hub of globally competent talent.

In a world with many poles, the argument "English is enough" is not

well-structured. English is still the language of business worldwide, but when an Indian diplomat or businessperson speaks a foreign language, the conversation shifts from a business deal to a cultural connection. It shows respect, helps us understand our partner's work culture better, and makes negotiations far more successful.

India's long history of being bilingual can make this transition easier. Cognitive research generally indicates that people raised in bilingual or multilingual environments acquire additional languages with greater ease. This

natural adaptability should be a big part of the Indian education system. The National Education Policy (NEP) 2020 encourages the addition of foreign languages at the secondary level; however, the implementation needs to be strong and widespread, going beyond token offerings to include high-quality, integrated programs. This necessitates investment in qualified educators and contemporary pedagogical approaches that emphasise communicative competence above conventional teaching techniques. Learning/Knowing a foreign language as a career and a profession has immense benefits. It increases job opportunities, as multilingual individuals who know a foreign language are a valuable asset in today's globalised era. Furthermore, knowing a foreign language enables the scope of global business with multilingual employees who can expand into new markets and strengthen their connections across different countries.

When we learn a foreign language, it means we are not only learning a new language, but we also gain an understanding of the culture of the country where that language is spoken. This understanding helps us raise our awareness, promote solidarity, and make us more open in today's world.

Today, in India, more students at the universities and in schools are learning a foreign language as compared to earlier times. Although many students are learning diverse languages, such as French, German, Mandarin, and Japanese, many of them are learning Spanish as it is a widely spoken language worldwide. It is even the second most spoken language in the USA after English. Therefore, if we know any foreign language, it enables us to become a truly global citizen.

Views expressed are personal

Education at Crossroads

The stakes involved in recruitment scams are directly relatable to the gloomy employment scenario; latest CMIE data shows that 44.5 per cent of Indians in the 20-24 age bracket are unemployed, despite many of them holding graduate, or even postgraduate degrees. On the other hand, industry leaders rue the shortage of good workers in their establishments. Thus, beyond a surfeit of candidates, there is another reason for mass unemployment; only 54.8 per cent of Indian graduates are considered employable

According to a report tabled in the Lok Sabha by the Minister of State for Finance, per capita net national income (NNI), in 2024-25 at constant prices was a meagre Rs 1,14,710. An analysis by Anil Swarup, a former Secretary to the Government of India, shows that after excluding the richest 5 per cent of population, per capita income of the balance 95 per cent of our population, at current prices, is US\$ 1,130 i.e., hardly Rs 1 lakh. Despite PM Modi's exhortation to youth to be job creators and not job seekers, it would be extremely difficult to set up a viable business with such limited resources - and the lack of vocational and business acumen that plagues Indian youth.

Young men, and young women also, are willing to work but the Government and society have no use for their services. According to the Madhya Pradesh Employee Selection Board (the infamous Vyapam in a new avatar), 9.76 lakh applications were received for 7,500 posts of constables, i.e., 130 applications for each post. Applicants included 42 Ph.D.s and over 12,000 engineers.

Similarly, 50 lakh applications, with a proportionately higher number of over-qualified applicants, were received for 60,000 police constable posts in Uttar Pradesh. The 2018 mega-recruitment drive of Railways was record-breaking in many respects; 2,83,747 vacancies were notified, for which more than 4 crore applications were received and 1,32,000 appointments were made. The balance appointments were not made even after four years; agitated candidates took to the streets, burnt a train, thereby drawing public attention to their plight.

The chronology of events is telling: tests were conducted in late 2020 and early 2021, and results were declared in December 2021 and January 2022, after which, instead of being issued with appointment letters, candidates were told that the tests they had appeared in were the first stage and another round of tests were to follow.

Apparently, the recruitment drive had fizzled out after conclusion of General Elections 2019 and Bihar Legislative Assembly Elections, 2020. The Railway's NTPC



(Non-technical Popular Categories) tests gained so much notoriety that the National Thermal Power Corporation Ltd. wrote to the Railways asking them not to use the abbreviation NTPC for their exam.

Leaked question papers of competitive examinations and delaying recruitment processes indefinitely are another blight on the hopes of unemployed youth. No examination seems to be untouched, be it constable recruitment tests in Rajasthan and Himachal Pradesh, BPSC examination in Bihar, or the head clerk examination in Gujarat; leaks are being reported regularly from almost all States, for all levels of examinations.

Irregularities in Government recruitment is nothing new; a former Chief Minister of Haryana, Om Prakash Chautala, underwent ten years' imprisonment for illegally recruiting more than three thousand junior basic teachers. A decade ago, the Chairman of the Punjab Public Service Commission was arrested for running a Rs.100 crore job racket. Then there was the constable recruitment scam in UP, in which around 22,500 constables were recruited in highly suspicious circumstances, in UP Police during 2004-06.

More recent is the West Bengal SSC scam, where more than Rs.125 crore of cash, gold and foreign currency were recovered from a former education minister and his female associate, allegedly as a quid pro quo for providing teaching jobs. As of now, the Enforcement Directorate (ED) has attached unaccounted assets worth Rs 636 crore in the case.

The stakes involved in recruitment scams are directly relatable to the gloomy employment scenario; latest CMIE data shows that 44.5 per cent of Indians in the 20-24 age bracket are unemployed, despite many of them holding graduate, or even postgraduate degrees. On the other hand, industry leaders rue the shortage of good workers in their establishments. Thus, beyond a surfeit of candidates, there is another reason for mass unemployment; only 54.8 per cent of Indian graduates are considered employable (India Skills Report 2025).

In a recent newspaper article, Nobel Laureate Abhijit Banerjee, pointed out that most of our youth waste the best years of their life in preparing for Government

recruitment examinations at which they have little chance of succeeding. He suggested that instead of competitive examinations, which often test skills that are not relevant for the position on offer, there should be a five-year apprenticeship for all posts, after which the best candidates should be given employment.

However, Banerjee's proposed solution is like a strip of band-aid, for a deep wound. The malaise runs much deeper; societal attitudes place a government inspector much ahead of a self-made entrepreneur, what to say of a private sector executive.

The mindless rush for government jobs will only end when the glamour, power, and oopari attendant of government employees is curbed - a highly improbable event. Then, we have remnants of our accursed caste system, which places a person doing nothing ahead of a person working honestly. Living in a small town during my younger days, I was perplexed when my farmer friends bemoaned the shortage of labour at their farms. One day, when I suggested to one of them that given their large family, they could themselves do much of the required work, I got a lesson in what an upper-caste person should do or not do - physical labour being a huge taboo.

Attitudinal change may take time; in the short-term tailoring the education system to jobs available could work wonders. At present, the antiquated syllabus of most universities prepares students for ministerial jobs - just as it did in Macaulay's time. With computers being far more efficient at repetitive tasks, there is little need for this kind of expertise; a telling indication is that even in reputed universities, graduate-level liberal arts and science courses draw few meritorious students - such courses being continued only because of institutional inertia and the for benefit of existing faculty.

Many engineering colleges established in the 1990s, which used to offer their seats at a premium, are now on the verge of closure. The reason is not far to seek: the IT industry that employed these engineers, most of them at basic jobs - is laying-off workers at record speed - in the last nine months 60,000 information technology (IT) employees have been laid-off in India, and the US IT industry has consistently been

laying-off around 1 lakh workers annually for the last few years. The situation is predicted to get much worse, with AI making much of the present IT workforce redundant.

The solution lies in a revamp of the education system by prioritising vocational education. National Education Policy, 2020 aims at integrating vocational education with academics, so that at least half of the students have exposure to vocational education by 2025. A Centrally Sponsored Scheme 'Samagra Shiksha,' covering Government and Government-aided schools, was launched for this purpose.

However, with most people seeing vocational learning as good only for other people's children, even a small part of the target of fifty per cent enrolment in vocational courses, has not been achieved.

The only way to popularise vocational education is to involve local industry in this endeavour. They would let local educational institutions know of their requirements, and guide them in designing industry-relevant courses. Pass-outs from such tailor-made courses would not have much difficulty in securing jobs.

Such initiatives are being attempted at several places: the Government of Karnataka has signed an MOU with a car company that will first expose faculty members to the car company's manufacturing and learning practices, so that they can guide children effectively; the ultimate goal being to enable students from Grades 9 to 12 to gain hands-on industry exposure and develop essential skills for future employment.

The NEP document visualised an investment of 6 per cent of our GDP for education, but till today actual expenditure is only half of that. Graduates from adequately funded colleges like the IITs and the new crop of private universities, which charge a bomb, hardly face unemployment - either in India or abroad. The problem of unemployment can be solved only when all colleges offer the same quality of education - making their pass-outs employable.

Good education is essential for all worthwhile things in life - not jobs alone. As Michelle Obama, attorney, author, and the erstwhile American first lady, had pointed out: "The ability to read, write, and analyse: the confidence to stand up and demand justice and equality; the qualifications and connections to get your foot in the door and take your seat at the table - all of that starts with education."



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Scientists create quantum entanglement in silicon chips



SASIMINI HANQUE PRINCE

The quantum world is strange. The laws of classical physics are not applicable here. Albert Einstein was one of the founding fathers of quantum theory and one of the greatest minds of his time. One such strange phenomenon in quantum mechanics is quantum entanglement. Einstein called it 'spooky action at a distance'.

Scientists once believed that signature entanglement was impossible, but scientists have done a lot of work on this. In the latest example, scientists have found entanglement between the nuclei of two atoms. Prof. Andrew Mielke from the University of New South Wales in Australia led a team of researchers in conducting the study. The world's second science journal published a research paper on this topic in 18 September.

shown in this study that quantum entanglement may be achieved between thousands of two atoms separated by approximately 20 micrometers, a low mass needed for quantum entanglement. In short, and how many new options are there? Quantum entanglement is possible, again, physicists said. Why is this important? Mendis feels it's a big deal. He says that the quantum computer has the potential to change the world. And that's what he would like to see. Quantum computers, however, none of them are working perfectly yet. Mendis says that quantum computers can achieve a lot of things that regular computers can't. For instance, quantum effects happen on a level that is below chemical reactions or when pharmaceuticals are made. That's why scientists are excited. That quantum computers can achieve these kinds of things at home.

have shown that it is possible to build more sophisticated quantum computers with the help of quantum entanglement in the future. They believe that the compact and accurate information using the most accurate and reliable method.

One of the most difficult aspects of developing quantum computers is achieving equilibrium between two opposing events. A quantum computer must be free of external noise. Even minor environmental low-frequency noise can have a significant impact on the output of this computer. However, if the gadgets inside the computer must communicate with one another in order to function effectively, noise may be generated. This noise is expected to slow their research until it is most effective.

Some quantum devices can do things exceedingly quickly. As a result, these devices make noise noise. There are also outside factors. Because of this, it is hard to get precise

findings from them. That's why people all across the world are trying to make quantum computers better.

Mandelkern put phosphorus atoms into silicon chips for their investigation; they captured and stored quantum information from the atoms' spins. Mandelkern remarked that a lot of research used to work together to produce a good quantum computer. So far, the only option to employ more than one nucleus was to put them very close together. There is only one electron that orbits the nucleus.

An electron is much smaller than a nucleus. Many people think that the sole factor that keeps the electron in a circular orbit is the nucleus's pull. Quantum mechanics, on the other hand, gives us a new way of looking at things. The electron is in one place, it can be in any place in the area. It will look like a cloud and spread out. This is why an electron can interact with

many models in the marketplace. A quantum computer utilizes quantum mechanics for its calculations.

But how much extra-special quantum electron control? Electron scattering occurs only at particular energy levels. That authority is limited. Therefore, it cannot interact with other nuclei. Thus, one electron cannot connect with millions of nuclei. The language was utilized for that. Electronic telegraphic technology based on this concept.

We carry to figure out how this technology works by doing a thought experiment. Let's say that a lot of people are in jail. In each cell, there are 20 prisoners. There is no sound coming from any of the cells. The room is soundproof. But prisoners can talk to one another. These conversations are to talk to other prisoners in different cells again. But no one else in the room could hear it. So they would talk with the help of the man who brought the mail in, so we

What is a electronic phone simply say, electrons do the work of a telephone here. Scientists employ a medium known as random block for this, because those electrons can oscillate and while it is stuck in a electron may come into contact with another electron in a falling high block.

As a result of this contact, two electrons get entangled, which initiates the entanglement process between them. Once the entanglement process begins, no electron will ever lose its connection to the other one, no matter how far apart they are. Surprisingly,

scarcely any information from the other orientation about the object, it can also be used to exert control over other objects.

Merkle and his team used this quantum entanglement property to demonstrate a method of controlling a multi-bit of an object. During this process they used electronics to control a quantum communication consisting of a telephone. It's called a direct channel.

Merkle and his team used the electron channel to perform quantum entanglement in a tracking system, a method called geometric gate. This method has enabled quantum entanglement with the use of the corresponding channel and the addition of direct control.

The scientists put the program back into effect, drop in that they were "N" structures again, which is not always, but this is a first model of the quantum level because they are studying the two main structures in

[illegible]

बेटियों की शिक्षा बदल रही भाग्य



डॉ. हमिका रानि

बेटियों की शिक्षा को प्रोत्साहन समाज के विकास और देश में बदलते संस्कृतिक संघ का एक महत्वपूर्ण अंग है

गुजरात के द्वारका में एक कार्यक्रम में नरेन्द्र मोदी ने पूछा था कि कितनी महिलाओं ने पांचवी कक्षा से आगे पढ़ाई की है। उन्हें यह जानकर आश्चर्य हुआ कि अधिकांश नुसुर्ग महिलाओं ने हाथ उठाया। जब कारण पूछा गया तो बताया गया कि नवकक्षाई ससनकाल में अगर पिता अपनी बेटियों को नहीं पढ़ाते थे तो उन पर जुर्माना लगाया था। उस समय निषेध का कड़ाई से पालन होता था। इसी वजह से कई साक्षर तो पढ़ी-लिखी हैं, लेकिन उनको पढ़ाई नहीं पढ़ पाई। यह उदाहरण एक बड़ी सच्चाई बताता है कि केवल अच्छी नीयत ही काफी नहीं है। इसके साथ जवाबदेही, नेतृत्व और नीतिवां भी जरूरी हैं। मोदी के नेतृत्व में भारत में यही बदलाव देखने को मिल रहा है। यह परिवर्तन निषेध-कानूनों का नहीं, बल्कि सोच बदलने से जुड़ा है। यह परिवर्तन सिर्फ बेटियों के स्कूल जाने तक सीमित नहीं है, बल्कि भारतीय समाज की नींव, स्वास्थ्य, अर्थव्यवस्था और जनसांख्यिकी को बदलने का है, तब

बेटियों को बदलाव का सबसे सरलतम माहक बनना जा सके और यह शिक्षा के माध्यम से ही संभव है।

गुजरात में मुख्यमंत्री रहने के दौरान ही मोदी ने समझा कि कन्या भ्रूण हत्या और लड़कियों की अशिक्षा जैसे समस्याएं सिर्फ कानूनों से हल नहीं हो सकती। इसके लिए जनता का सोच बदलना जरूरी था। बेहतर सुविधाएं और प्रोत्साहन भी देने थे। वर्ष 2003 में शुरू हुई कन्या केलवणी मुहिम इसी बदलाव का जरिया बनी। इस अभियान में बेटियों की शिक्षा के माहल के बारे में जनसंख्या बढ़ाई और स्कूलों में लड़कियों के लिए अलग सौचालय जैसी बड़ी समस्या का हल निकाला। सौचालय के अभाव में कई बच्चियां किशोरावस्था में पढ़ाई छोड़ देती थीं। उसा योजना के तहत बड़े सकारात्मक रहे। एक समय राष्ट्रीय औसत से कम रही गुजरात में महिला साक्षरता दर बढ़कर 70 प्रतिशत तक पहुंच गई। तब राष्ट्रीय औसत 64 प्रतिशत था। सबसे बड़ी उपलब्धि यह रही कि लक्षित जिलों में लड़कियों के स्कूल छोड़ने की दर 90 प्रतिशत तक घट गई। मोदी ने इस नीति को सिर्फ सरकारी योजना नहीं रहने दिया, बल्कि जनसेटलन बना दिया। उन्होंने सार्वजनिक कार्यक्रमों में मिले उपकरणों की नीलामी से लड़कियों की शिक्षा के लिए 19 करोड़ रुपये जुटाए और खुद 21 लाख रुपये का व्यक्तिगत योगदान भी दिया। इन प्रयासों से एक मजबूत संदेश गया कि बेटियों की शिक्षा केवल सरकार का काम नहीं, बल्कि पूरे समाज की जिम्मेदारी है।

गुजरात की सफलता से प्रेरित होकर बेटी बचाओ, बेटी पढ़ाओ अभियान को 2015 में पूरे देश में शुरू किया



अश्विनी राजगुप्ता

गया। इसके दो उद्देश्य थे। पहला कन्या भ्रूण हत्या रोकना और दूसरा बालिका शिक्षा को बढ़ावा देना। शुरुआत में यह योजना 100 ऐसे जिलों में लागू हुई जहां लिंगानुपात की स्थिति सबसे खराब थी। बाद में यह पूरे देश में लागू की गई। इस योजना का लिंगानुपात सुधार पर सीधा असर पड़ा। वर्ष 2015 में प्रति 1,000 लड़कों पर लड़कियों की जो संख्या 919 थी, वह 2019-21 तक बढ़कर 929 हो गई। लिंगानुपात में सुधार तो इस तस्वीर का सिर्फ एक पहलू है। बढ़ा बदलाव शिक्षा के जरिये आकार ले रहा है। बेटियों की शिक्षा नई सकारात्मक परिवर्तनों का माध्यम बनती है। पढ़ी-लिखी महिलाएं आम तौर पर देश से शरीर करती हैं और कम बचों पैदा करती हैं। भारत की कुल प्रजनन दर (टोटलफर) अब 2.0 पर आ गई है, जो जनसंख्या को स्थिर रखने के स्तर से भी कम है। यह बदलाव सोपे तौर पर महिलाओं की बढ़ती शिक्षा और कमकाम में घनीयारी से जुड़ा है। शिक्षित महिलाएं गर्भावस्था और प्रसव के समय देखभाल को लेकर भी सावधानी बरतती हैं। नविका शिक्षा

मृत्यु दर में आ रही कमी इस हलान का पुट भी करती है।

कामकाजी आबादी में महिलाओं की भागीदारी को लेकर जरूर कुछ चुनौतियां कायम हैं, लेकिन स्वास्थ्य, शिक्षा, विज्ञान-तकनीक और उद्योगिता जैसे क्षेत्रों में उनकी संख्या बढ़ रही है। ये न क्षेत्र हैं, जहां पढ़ाई और कौशल का सबसे अधिक महत्व है। महिलाएं अब राज्य अधिकारियों से लेकर टेक स्टार्टअप के सीईओ पर की सुरक्षित कर रही हैं, जिनकी कल्पना कभी उनके करीबियों ने भी नहीं की होगी। अध्ययन बताते हैं कि शिक्षित माताओं के बच्चे पढ़ाई में बेहतर करते हैं और उनका स्वास्थ्य भी अच्छा रहता है। यह सकारात्मकता का एक सकारात्मक चक्र है, जो हर पीढ़ी को प्रभावित करता है। मध्य प्रदेश के जलिया सरो के अनुसार 89.5 प्रतिशत लोग बेटी बचाओ, बेटी पढ़ाओ योजना के बारे में जागते हैं और 63.2 प्रतिशत का कहना है कि इस योजना ने उन्हें बेटियों को स्कूल भेजने के लिए प्रेरित किया। समाज में जल्दी शादी दालने और बेटियों की उच्च शिक्षा

को बढ़ावा देने का समर्थन भी बढ़ा है। ये हलान उस संघ में बदलाव को दर्शाते हैं, जहां कमी बेटियों को पूरी तरह से स्कूल जाने से रोक दिया जाता था।

बेटियों की शिक्षा को प्रोत्साहन और इस मोर्चे पर अब तक की प्रगति हमारे समाज के विकास और पूरे देश में बदलते सांस्कृतिक संघ का एक महत्वपूर्ण अंग है। यह बदलाव गहरा और स्थायी है, जिसे युवा महिलाओं को सकारात्मक बनाने के लिए सोच-समझकर बनाई गई प्रभावी नीतियां संभव बना रही हैं। इन पहलों का दीर्घकालिक असर और भी स्पष्ट होगा, क्योंकि यह सकारात्मक चक्र न केवल व्यक्तिगत जीवन, बल्कि पूरे समुदायों को बेहतर बनाता है। आज को पढ़ी-लिखी बेटियां सिर्फ छात्राएं नहीं हैं, वे कल की संघर्षिता नेता, नीति-निर्माता और बदलाव लाने वाली शक्ति हैं। शिक्षित बेटियों की भविष्य में परिवर्तन आप में योगदान करने और बच्चों की शिक्षा में निवेश करने की अधिक संभावना भी होती है। महिला शिक्षा में प्रगति दिख रही प्रगति को लेकर हम अविश्व को लेकर अवशर्षित हो सकते हैं कि प्रधानमंत्री मोदी के नेतृत्व में शुरू किए गए बदलाव अगे और गति पकड़ेंगे। इससे एक ऐसा समाज आकार लेता, जहां हर लड़की को सीखने, बढ़ने और सफल होने का समान अवसर मिले। यह आवश्यक ही नहीं अनिवार्य भी है, क्योंकि जब आप एक लड़की को शिक्षित करते हैं, तो आप पूरे समाज को अगले ले जाते हैं।

(लेखिका प्रधानमंत्री की अर्थिक सलाहकार परिषद की सदस्य हैं।)

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Studying in America Getting Less Yeehaw?

Thinning job funnel for Indian students

Foreign students already enrolled in US universities have been exempted from the recent hike in H-1B visa fees. This is relief for international students in academic research programmes who are undergoing optional practical training at US companies. But the numbers involved are small, and are unlikely to alter the market dynamics for Indian students studying in US universities. Indians constitute the biggest group of overseas students in the US, and their number has shrunk drastically this year. Uncertainty over job prospects after completing college is knocking off the US as the top draw for Indian students seeking degrees overseas. This is also being aided by other countries sweetening the welcome for Indian students.

The US is reversing its migration policy at a point when demographic changes are forcing much of the advanced world to turn to foreign students to fill up college classrooms. This will cause structural shifts in the market for higher education in the US and other G7 countries. The US has, so far, been most dependent on migration to augment its tertiary sector workforce. This involved intake both at the pre- and post-training stages. As entry barriers rise for foreign trained



professionals in the US, there will be spillover effects on the market for higher education in the country. The quality of academic output at US universities will also be affected.

The cohort of Indian students in the US now face a thinning employment funnel at large companies that can absorb the enhanced H-1B visa fee. Smaller firms, especially startups, may have to scout for alternative jurisdictions where they can employ foreign students graduating from US universities. This imposes an additional cost on US innovation, apart from losing the ability to pull in overseas students. The top talent will, of course, still be headed for the US with its deep academia-business engagement. But other host nations are poised to witness a change in the profile of their international students and consequent changes to their academic output.

Beyond H-1B visas, attracting talent

The guidelines regarding H-1B visas issued Monday should come as a relief to the large Indian student community in the US. The government has clarified that foreign students already in the US (under F-1 student visas) can transition to H-1B work visas without paying the recently introduced \$100,000 (H-1B visa) fee.

However, the fee, introduced against the backdrop of rising anti-immigrant sentiment across the US, has triggered fear and uncertainty over education and employment opportunities in the US. Fewer Indian students now seek admission in US universities. Our government and universities must see an opportunity in this crisis. The outflow of young, bright students to US universities is both a loss of talent and money. Most stay on in the US to work in that country, including in academia. New Delhi should work on reversing this by exploring *atmanirbharta* (self-reliance) in education.

India should build the capacity to attract students who may want to study in the US and those who may want to leave the US and explore opportunities elsewhere. For sure, this is not going to be easy. Bright students opt for American universities because of their brand value and the learning ecosystem they provide. Not all of it can be replicated immediately. The US universities are beneficiaries of legacy investments, including philanthropy, in learning and research, and they have mostly been welcoming of talent and independent inquiry. Top education facilities in India, such as the IITs and central universities, have the infrastructure to attract talent — both students and faculty. Also, US universities could be cajoled to take a cue from the tech firms, which are building capacities in countries such as India to firewall their business from the Trump Administration, to set up campuses here. A message should also go out that Indian campuses are welcoming of research and knowledge production, and that red tape or ideology will not be allowed to stymie such pursuits.

24/12

ROOTS FOR STEM

Push to attract academics from abroad is welcome. It must be backed by ecosystem that also nourishes homegrown talent

WHEN IT COMES to global soft power, ideas travel farther than capital. And for decades, some of India's sharpest minds have boarded outbound flights, drawn not just by better pay or prestige, but by the promise of institutions that value inquiry and reward rigour. Now, with the Donald Trump administration's crackdown on US varsities, the Centre's initiative to attract top-tier Indian-origin "star faculty" from abroad, as reported by this newspaper, is a welcome, and in many ways, well-timed move. The proposal to reverse the brain drain — by offering substantial grants, operational flexibility, and lab infrastructure to returning scholars — could help elevate Indian research in STEM disciplines. India already has a fertile history of collaboration with industries led by Indian-origin business leaders — Google's recent investment of \$15 billion to build an AI data hub in Andhra Pradesh is one example. But if the aim is to build a globally competitive knowledge economy, repatriation efforts alone won't suffice. India must strengthen the academic ecosystem at home to ensure it is not only attractive to returnees but also empowers those who have stayed and contributed to its institutions.

This strengthening begins with recognising that India already has a solid foundation in institutions such as the IITs, IISc, ISI, TIFR, and newer centres like the IISERs and CMI, which have produced outstanding work, often despite limited resources. For any reintegration scheme to succeed, these institutions must be bolstered with sustained investment, transparent governance, and genuine academic autonomy. The example of China's Thousand Talents programme is instructive. Launched in 2008 as part of a broader push to transform China into a knowledge-driven economy, it was accompanied by a systemic overhaul of universities, creating cutting-edge facilities that supported both returning scholars and domestic talent. The result is evident: China now has five universities in the QS World University Rankings' top 100, and 72 overall, ranking third globally, after the US and the UK. In contrast, India, though at number four globally with 54 institutions on the list, is yet to break into the top 100. IIT Delhi, at 123, is the country's highest-ranked institution.

India's ambition must also be broader than strategic STEM nationalism. Higher education cannot be reduced to a pipeline for industry, its imagination must overcome the narrowly instrumental. True innovation flourishes in interdisciplinary, and often inconvenient spaces — where social scientists question the ethics of AI, or historians challenge majoritarian narratives. The government's emphasis on AI, quantum computing and biotech must sit alongside robust support for the humanities and social sciences, both to inform technological development and to anchor it in social context. It must also address a broader question of openness. Episodes such as the deportation of scholars like SOAS's Francesca Orsini send a dispiriting message about how India treats academic inquiry that doesn't align with official narratives. If it wants its diaspora to return — not for a few years, but to build — India must offer them not just lab space or grants, but the freedom to ask difficult questions. Repatriating brilliance is only a beginning. Building a home for it to thrive in is the real test.

50/10

राहत, पर चिंता भी

अमेरिका ने H-1B वीजा नियमों में ढील देकर प्रवासी स्टूडेंट्स और प्रफेशनल्स को ही नहीं, अमेरिकी कंपनियों को भी बड़ी राहत दी है। इसका सबसे ज्यादा असर पड़ेगा प्रवासी भारतीयों पर। हालांकि ट्रंप प्रशासन की अस्थिर नीतियों को देखते हुए अब भी कुछ चिंताएं हैं।

हड़बड़ी में बदलाव | ट्रंप सरकार ने बीते 19 सितंबर को ऐलान किया था कि H-1B वीजा के लिए एक लाख डॉलर की एंट्री फीस ली जाएगी। दो दिनों की डेडलाइन के साथ जिस हड़बड़ी से नए नियम लागू किए गए, उसने प्रवासियों में ही नहीं, अमेरिकी इंडस्ट्री



H-1B नियमों में ढील

में भी हलचल मचा दी थी। अब नए बदलावों के मुताबिक, जो लोग पहले से अमेरिका में रह रहे हैं, वीजा स्टेटस बदलना चाहते हैं, रिन्यूअल या एक्सटेंशन कराना चाहते हैं - उन्हें बड़ी हुई फीस नहीं देनी पड़ेगी।

भारतीयों पर असर | ट्रंप सरकार के पहले तक अमेरिका हर साल 65 हजार लोगों को वीजा इशू कर रहा था। प्रफेशनल्स के लिए अलग से 20 हजार वीजा दिए जा रहे थे। इनमें से करीब 70% H-1B वीजाधारक भारतीय हैं। इसी तरह से 2023-24 सेशन में 3.3 लाख भारतीय स्टूडेंट्स अमेरिकी संस्थानों में रजिस्टर्ड थे। हर साल अमेरिकी कंपनियां बड़ी संख्या में भारतीयों के लिए H-1B वीजा स्पॉन्सर करती हैं। लेकिन, एक लाख डॉलर की फीस उन्हें भी भारी पड़ती।

ट्रंप पर दबाव | ट्रंप सरकार पर देश के भीतर से ही उद्योग जगत का दबाव था। पिछले ही हफ्ते US चैंबरस ऑफ कॉमर्स ने सरकार के नए नियमों को कानूनी चुनौती दी थी। संस्था का कहना था कि इससे अमेरिकी कंपनियों के लिए कुशल श्रम महंगा हो जाएगा, जिसका असर अर्थव्यवस्था पर पड़ेगा। साथ ही, प्रफेशनल्स की कमी हो सकती है या फिर कम स्किल्ड कर्मचारियों से काम चलाना पड़ सकता है।

प्रवासियों पर सख्ती | हो सकता है कि चौतरफा आलोचनाओं और दबाव की वजह से ट्रंप सरकार को H-1B में छूट देनी पड़ी हो, लेकिन प्रवासियों को लेकर उसका सख्त रुख अब भी कायम है। अमेरिकी विश्वविद्यालयों में विदेशी स्टूडेंट्स की संख्या अब कुल एडमिशन में 15% से अधिक नहीं हो सकेगी और किसी एक देश से आने वाले छात्रों की संख्या 5% से अधिक नहीं होगी। इससे प्रतिभाशाली स्टूडेंट्स के लिए अमेरिका में जाना वैसे भी बहुत मुश्किल हो गया है। फिर, ट्रंप की पॉलिसी में अस्थिरता रही है, तो निश्चित रूप से कोई नहीं बता सकता कि कब इमिग्रेशन से जुड़े नए दिशा-निर्देश आ जाएं। इस अस्थिरता से अमेरिका की इमेज भी कमजोर हो रही है।



TARIQ MANSOOR

AN INSTITUTION BUILDER

Sir Syed Ahmad Khan stood for diversity, fraternity — values championed by AMU

SIR SYED AHMAD Khan (1817-1898), often known only for founding the Aligarh Muslim University (AMU), was a multifaceted figure who profoundly influenced Indian society. His roles as an educator, social reformer, cultural conservationist, biographer, political ideologue, and institution builder take him beyond merely being the saviour of the Muslim community after the 1857 War of Independence.

A person's text should be judged in the context of the period in which they lived. Many describe Sir Syed as the votary of Muslim separatism in India. A selective reading of some of his writings might suggest that. Did Sir Syed provide any ideological rationale for the two-nation theory? The answer to this pertinent question lies in his concept of the nation. Sir Syed used the term "Qaum" interchangeably for both nation and community. He frequently refers to it as a conglomeration of country and community with religious affinity and beyond.

Setting off the much-needed project of educational renaissance, he invited Hindus and Muslims to unite to eradicate ignorance by opting for modern education. His first venture to improve the lives of Indians was the establishment of a school in 1875. At the outset, he explained his concept of the nation — "There is no doubt that Madrasat Uloom (the school that grew into a university in 1920) is a means of 'national' progress. By the word

He was nominated as a member of the Viceregal Council, and the Indian Association of Lahore gave him a reception. Replying to the address, Sir Syed said, "It was my earnest and sincere desire that I should faithfully serve my nation. All of us, whether Hindus or Mahomedans, live on one soil, are governed by the same rule, have the same resources of our advantage and equally share the hardship of a famine."

'nation' here, I do not mean Muslims alone, but Hindus and Muslims both."

Hindu-Muslim affinity remained a cardinal principle throughout his life. He was nominated as a member of the Viceregal Council, and the Indian Association of Lahore gave him a reception. Replying to the address, Sir Syed explained that he intended to keep the parochial or sectarian approach at bay. "It was my earnest and sincere desire that I should faithfully serve my nation. All of us, whether Hindus or Mahomedans, live on one soil, are governed by the same rule, have the same resources of our advantage and equally share the hardship of a famine. These are the various grounds on which I designate both the communities that inhabit India as the nation." Indeed, Sir Syed's insistence on inclusivity closely resembles our National Education Policy (NEP), which puts a premium on equality and inclusivity.

The warm rapport between the two communities has existed since the inception of the Mohammedan Anglo-Oriental (MAO) College in 1877, the precursor of AMU. This was not an easy task, given that British rule infused a narrative of hatred into the social fabric. But it had little impact on Sir Syed's words and deeds. The Bismillah ceremony (traditional ceremony of initiation into education) of his grandson Ross Masood was solemnised by Raja Jai Kishan Das by keeping

the child in his lap. Not only did he lay the foundation of comparative religious studies at MAO College, but he was also the first Muslim to write a commentary on the Bible.

Despite the periods of trials and tribulations, AMU has never abandoned its inclusive character by keeping its doors open to all. Drawing students from 31 states and 26 foreign countries, it epitomises all cultures thriving. It has also played a significant role in India's quest to build friendly ties with the Muslim world.

Bestowing one of the most befitting tributes to Sir Syed's legacy, Prime Minister Narendra Modi termed AMU a "mini India" in his address on the university's centenary in 2020. Invoking Sir Syed while underscoring the principles of nation first and development without any discrimination, the PM said, "I would like to remind you of one thing said by Sir Syed. He had said, 'The foremost duty of one who is concerned about his country is to work for the welfare of all people, irrespective of the caste, creed or religion.' Sir Syed had said, 'Just as each part of the body is necessary for good health, development of all is essential for the prosperity of the country.'"

To this day, Sir Syed's lamp remains lit.

The writer is former vice chancellor, Aligarh Muslim University and a nominated member of the Uttar Pradesh Legislative Council.

24/10

Jobs crisis is governance crisis

Public sector vacancies affect service delivery — from education to civil aviation, railways and healthcare. They also hurt national security



ZERO HOUR

BY DEREK O'BRIEN

I HAVE BEEN writing for this newspaper for the last six years. When was the last time I did back-to-back columns on the same subject? Never. This is a first. A fortnight ago, the topic of this column, Zero Hour, was unemployment in the private sector ('Lost in the election chatter', IE, October 24). This week, we zero in on unemployment in the public sector.

The youth unemployment rate is almost thrice the national average unemployment rate. The government, the single largest employer in the country, has not filled lakhs of vacancies.

While the government talks much about *Viksit Bharat* by 2047, a closer look at the number of vacancies in the public sector (once considered the bedrock of class mobility) tells a very different story. From teachers and doctors to scientists and security personnel, staffing shortages have spared no sector. This has precipitated not just a jobs crisis but also a gaping governance deficit. Here is just one example: Almost 2 crore people applied for 64,000 railway vacancies.

There are crippling vacancies in the education sector. Look at these numbers. Over 12,000 posts remain vacant across the Kendriya Vidyalaya and Navodaya Vidyalaya schools. There are over 1 lakh schools operating with just a single teacher as per the UDISE+ Report 2024-25. Further, one out of every four posts in central universities is vacant. As highlighted by a parliamentary committee, this shortfall has impacted both the faculty-student ratio and the quality of teaching.

The vacancy endemic extends to the field of research and development. In the Satish Dhawan Space Centre, Srihankota, more than a quarter of posts, across scientists, engineers and administrative staff, are vacant, while nearly two out of five posts for scientists are vacant at the Council of Scientific and Industrial Research (CSIR). This is directly reflected in India lagging behind countries like the USA and China in innovation, scientific publications and patents.

Let us examine rural healthcare. Seven out of ten of the specialist positions in Community Health Centres lie vacant, whereas a fifth of positions for doctors remain unfilled. Even elite institutions like AIIMS suffer from faculty shortages, with two out of five posts vacant among the 20 oper-

ational AIIMS in the country. Shortfalls in this critical sector compromise patient welfare and overburden healthcare personnel.

The clouds overhead are dark. Much also needs to be done to put things on track. In the Directorate General of Civil Aviation (DGCA), one out of two posts is vacant. A parliamentary committee has called this out: "critical vulnerability at the heart of India's safety oversight system". Additionally, the Air Traffic Controllers' Guild had raised concerns over the persistent shortage of controllers, leading to closure of critical operational units and hampering emergency responses.

The National Crime Records Bureau (NCRB) report, published recently, reveals a 6.7 per cent increase in railway accidents in 2023 over the previous year. This comes at a time when more than 1.5 lakh vacancies exist in the safety category alone in the railways, as per an RTI reply.

The government thumps its chest on its uncompromising attitude on national security. What's the ground reality? The National Investigation Agency (NIA) has three out of ten positions vacant across sanctioned posts, hindering effective investigations. The paramilitary forces, whose remit includes border protection, currently have over 1 lakh vacancies. This translates into gaps in national security and pressure on the existing forces, leading to increasing suicides and fratricides among personnel.

Even the institutions charged with protecting the most vulnerable are not immune to the vacancy plague. In a reply to a question asked recently in Parliament by your columnist, the Union government admitted that the positions of chairperson, vice-chairperson and members of the National Commission for Minorities are lying vacant. Similarly, the posts of vice-chairperson and one member (out of a total of two) in the National Commission for Scheduled Castes have been vacant since March 2024.

The Department of Health and Family Welfare has a shortfall of one-fourth of its manpower while bodies like the Central Board of Direct Taxes and the Central Board of Indirect Taxes and Customs are staring at vacancy rates of 34 per cent and 26 per cent respectively.

During the Monsoon Session of Parliament a few months ago, answer's tabled by the Union government put the figure of vacancies in the public sector at around 15 lakhs. Fill the vacancies. Turn jobs into a reality. It is time to turn *Viksit Bharat* into *Fixt Bharat*.

PS: Someone promised 2 crore jobs annually. It was the Roman poet Ovid who said, "Everyone's a millionaire where promises are concerned."

The writer is MP and leader, All India Trinamool Congress Parliamentary Party.
Research credit: Anjana Ancharil

24/10

Aligning global learning with NEP 2020



**SURBHI
SOOD**

2ND OPINION THE PIONEER

As India's National Education Policy (NEP) 2020 reshapes the academic landscape, international curricula are being evaluated for their ability to align with its reform goals. The Western Australian Certificate of Education (WACE), developed by the School Curriculum and Standards Authority (SCSA) under the Government of Western Australia, has emerged as a strong contender.

In 2023, it achieved equivalence from the Association of Indian Universities (AIU) for both Class 10 and Class 12 — enabling Indian students to earn a globally recognised qualification within the national framework. "We received AIU

equivalence after a rigorous evaluation process," says Angelique Smith, Principal Consultant at SCSA. "It validated WACE's academic parity with India's leading boards and positioned it as a credible international option." Unlike private international boards such as IB or Cambridge, WACE is the official government curriculum of Western Australia. Its balanced 50:50 evaluation model — half based on schoolwork and half on final exams — promotes continuous assessment, project-based learning, and deeper understanding. Equally central is its commitment to teacher training; educators must complete at least 150 hours of professional development annually through online modules, mentoring, and classroom visits.

"Curricula succeed only when teachers feel confident delivering them," says Smith. WACE mirrors NEP 2020's emphasis on flexibility, multidisciplinary learning, and reduced rote learning. "WACE already does what NEP envisions — competency-based, inquiry-driven, and focused on real-world skills," explains Ahmed. Students can blend disciplines — pairing physics with design or economics with digital technologies — reflecting a shift towards creativity and applied learning. WACE India integrates digital literacy and AI awareness across subjects. "AI isn't a stand-alone subject — it's woven into every discipline," says Smith.

"Students learn to use AI tools responsibly and critically," Ahmed adds, "just as computers became integral to all professions, AI will be too. WACE ensures students are future-ready." "If Australian students study a European war, Indian students might explore a local historical event instead," says Smith. The curriculum accommodates Indian languages and histories, helping schools remain rooted in national identity while meeting global benchmarks. Graduates receive both

the WACE certificate and an ATAR (Australian Tertiary Admission Rank), accepted by leading global universities, including the US Ivy League, the UK's Russell Group, and Canada's top institutions. In India, AIU equivalence allows seamless admission to national universities. The University of Western Australia also offers WACE graduates special bursaries worth AUD 20,000. WACE India has partnered with schools such as DPS North and East Bengaluru and Shaheen International, Bidar, aiming to reach 100 schools within four years through collaborations with state governments and TAISL. "Our goal isn't another board," concludes Ahmed. "It's to build a model that empowers teachers and prepares India's youth for the future."

ride

Surbhi Sood is a content writer who writes on education and ethics

The Pioneer
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Click, Learn, Thrive

While terms like 'game-changing' and 'disruptive' have become watchwords in modern day digital information contexts in the age of AI, as educators we are not oblivious to the hype of paperless education, whiteboards and similar education fads. The utilities of such changes are hardly contested but what seems to have receded into the background is the ethical education that should drive digital information drives, acute and active awareness campaigns among stakeholders to decipher the true from the false and misleading, and active penal provisions to deter information misuse



impact vital human endeavors such as education, sports, outreach activities and economic activities and trade.

While the potential for the abuse of the digital information platforms have been well understood and documented, with preventive laws in place, the contemporary craze for Artificial Intelligence as the governing platform of information propagation is developing into a destructive tool at the hands of the unscrupulous by not only simulating the real with the false but also influencing human beings into believing evidently incorrect information as true. In the hands of the unscrupulous, such AI managed tools can evolve into destructive weapons harming people in ways not anticipated before. A classic contemporary malady is the pervasive damage caused through the 'digital arrest' phenomena which influences many to believe a blatant falsity as genuine and forces people to part with money for relief from a hazard that does not exist in the first place.

Recognizing the ever-increasing potential for modern-day information to be abused in innovative and criminal ways, the United Nations have been actively propagating the abusive paradigms of information literacy, information misuse, social media abuse and AI generated falsities. Presently in its fourteenth campaign year, UNESCO hosts the Global Media and Information Literacy (MIL) Week in the last week of October.

With the theme "Navigating AI: Media and Information Literacy in the Age of Artificial Intelligence", this year's discussions will focus on the intersections of Media and Information Literacy and AI, and how AI is reshaping the information landscape given that MIL is crucial to empower individuals to critically engage with AI-driven content.

While terms like 'game-changing' and 'disruptive' have become watchwords in modern day digital information contexts in the age of AI, as educators we are not

oblivious to the hype of paperless education, whiteboards and similar education fads. The utilities of such changes are hardly contested but what seems to have receded into the background is the ethical education that should drive digital information drives, acute and active awareness campaigns among stakeholders to decipher the true from the false and misleading, and active penal provisions to deter information misuse.

Interestingly, instances of lack of information literacy are not limited to developing countries alone but have disrupted life and living in developed economies as well which highlights the urgent necessity to drive information literacy campaigns with a consistent global energy. Media and Information Literacy (MIL) is more crucial than ever in ensuring that individuals can critically assess AI-generated content, understand the implications of data-driven media, and engage critically in digital spaces. As AI continues to evolve, MIL must adapt to equip people with the knowledge and skills to

navigate this rapidly changing landscape.

Instances of the importance of digital literacy and the destructive effects of artificially induced intelligence platforms were felt as early as 2014 when an AI bot designed by a global internet giant with data from forty million conversations used to accurately predict the mental states of a user through language analysis, was sabotaged when users injected dictatorial and racist inputs on a large scale thereby converting an innocent chat bot into a repulsively racist platform that indiscriminately replied in racist overtones even to innocent inputs.

This was the first evidence that whatever

the tag, there is nothing 'artificial' in intelligence and that most artificial intelligence platforms are an agglomeration of enormous global data generated and collated through individual human inputs. Paradoxically, people interacting and using AI platforms today are assuming that such platforms are inherently unbiased and accurate and are therefore used to form opinions, arrive at judgements and even decide on future avenues of action.

It is becoming increasingly apparent that there shall be little interventions at global governance levels to counter misinformation and fakes other than preventive awareness campaigns. With no official 'gatekeeping' in the global information domain, it rests on individual users to be aware of differentiating the true from the false and the genuine from the 'deepfakes'.

UNESCO as a global body has rightly embarked on a sustained intervention strategy that seeks to bring information literacy to the classrooms by educating learners at their most vulnerable age to responsibly use information on the internet. This strategy also involves empowering learners to laterally 'read' internet content to detect inconsistencies, tracing media and information to the original sources, verify authenticity by corroborating through multiple platforms, train as digital detectives by approaching digital information with skepticism prior to verification, and learning to adapt to the changing media landscape. Policy planners at the level of government shall do well to induce such information verification strategies even at the early education level so that misuse can be detected in time and avoided.

In these difficult times, with very few specific and predictable inputs on how the digital information scenario would change in the context of AI, the best way forward would be to empower early learners to adapt consistently and responsibly since the challenges are both real and comprehensive and they are there to stay. *sanku*



RUDRASISH DATTA

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Please mind the gap



SHOBHIT MAHAJAN

Making India a scientific, technological powerhouse needs reimagination of research architecture

A RECENT NEWSPAPER report (IE, October 22,) mentions that the government is considering a scheme to attract "Indian-origin star faculty" in STEM areas to come and work in Indian institutions. The idea is to capitalise on the Donald Trump administration's recent policies of squeezing higher education and research in the US, and strengthen the research ecosystem in our country.

While the recent policy changes in the US could act as a push factor, the government is also considering making the scheme attractive enough to act as a pull factor. Thus, the returning researchers will be given positions in premier research institutions and a substantial set-up grant to establish research infrastructure. The institutions include the research institutes as well as the IITs.

The idea of harnessing NRI talent is not a new one — previous schemes offered them short-term positions for collaborative research. These schemes were not terribly successful and in many instances were used by the NRIs as a paid vacation to visit their relatives, give their children a taste of Indian culture, etc. This one is different since it is designed for longer-term engagement. Globally, several countries are also offering incentives for researchers who would want to escape the stifling research environment in the US.

On the face of it, the scheme sounds like a win-win for all. The researchers will get to work in a relatively benign environment, be closer to their roots, and possibly feel a sense of pride in contributing to the motherland while we would gain from their experience and competence. However, as they say, the devil is in the details.

Setting up research infrastructure would involve equipment as well as human resources. A "substantial set-up grant" only makes the funds available. Procurement is another story altogether. Given the financial rules for spending government money, buying anything from state-of-the-art equipment to humble laptops can be a trying experience. The tendering process, the objections of the finance departments, de-

lays in disbursement of funds, etc., are extremely time-consuming and tiresome. One frequently hears researchers complaining that they spend more time chasing files in the administration and finance departments than in pursuing research. The bureaucratic maze is one of the biggest headaches for even the resident researchers, though they have learned to navigate through it over time. Procedures for hiring qualified staff are also needlessly complicated, with multiple levels of oversight and regulation.

Since the researchers will be based in existing research institutions, there is also the question of cultural adjustment. Every institution has a culture to which the resident scientists have got accustomed. To be suddenly air-dropped into an institution's existing cultural environment and adjust to it could be challenging, especially for scientists who are used to a totally different ethos in the US. Although some of our research institutes might boast of world-class scientific infrastructure, it is the overall working atmosphere that the returnees might find difficult to get used to. There is also the issue of the huge differentials in salaries (even with PPP-based exchange rates) that the researchers would need to get used to.

The returning researchers, especially if they are coming for longer periods, would also be faced with the usual problems that living in India entails. The abysmal public services, the difficulties of finding suitable housing, organising children's education, etc., are all essentials that can test even a hardened resident and might be totally frustrating for the NRI used to relative seamless transitions from one city to another in the US. Add to this the fact that since most research institutions are based in metros, the quality of air is unhealthy, to put it mildly. Since most of the researchers would have children, this could be a huge deterrent.

Giving all kinds of incentives to the returning researchers would also have an impact on the existing manpower in the institutions. This officially sanctioned system

of privileges would breed resentment among those who have spent their lives in those institutions and have a potentially demoralising impact in the long term.

One of the countries that has had a similar scheme with some degree of success is China. The scheme, officially called the Thousand Talents Plan, ensures lavish grants and housing as well as an easier visa process (something that we should think about, given the recent cases of academics being deported from airports). The returnees are colloquially referred to as "sea turtles", which in Mandarin is a homophone for the phrase meaning returning from abroad.

The Chinese situation is different from ours — first, Chinese-origin scientists have been having immigration and visa problems in the US and Europe for a much longer time. Second, by any metric, the number of truly world-class institutions in China is much more than in India. These include not just research institutes but also universities that regularly feature very high in institutional rankings. The overall spending on R&D in China was 2.7 per cent of the GDP, while in India it is a measly 0.65 per cent of a much lower GDP. Interestingly, there have been reports of a growing resentment among the native Chinese scientists of the implicit apartheid in treating the returnees as royalty.

The stated aim of utilising the experience and competence of NRI scientists is, of course, a noble one. However, making India a scientific and technological powerhouse needs sustained action on many fronts. These include a massive increase in R&D spending, implementing "ease-of-doing-research" regulations, broad-basing our scientific institutions, especially the universities where the future manpower is to be trained (instead of focusing solely on elite institutes) and a commitment of long-term funding. If we ensure all these things, there will be no reason for the Olive Ridley turtles to not return to their birthplace.

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3410

What has the U.S. clarified on H-1B visas?

What is the exemption for foreign students? Will it be easier for the IT industry and students to seek visas? How have the rules been eased for anyone wanting to switch visa categories? Why is there a pushback from U.S. industry as well?

Saptaparno Ghosh

The story so far:

In a softening of stricter immigration controls announced this September, the U.S. Citizenship and Immigration Services (USCIS) clarified on October 20 that current holders seeking an extension or wanting to switch their visa category would not have to pay the \$1,00,000 fee to process H-1B applications. This fee would only be applicable to the new applications made after September 21 post-midnight hours in the U.S. (Eastern Time). Though the clarification does offer some reassurance, there is apprehension in various sectors, particularly the IT industry, about the Trump administration's inward-looking policies.

What is the clarification?

The immigration services department has clarified that those seeking an extension or wanting to switch their visa category, say, from a student's visa (categorised as F-1) to an H-1B visa, would not have to pay the processing fee. More importantly, the USCIS said the Secretary of Homeland Security could allow for an exception in certain "extraordinarily rare circumstances" wherein the applicant has been determined to serve a certain national interest, and no

The U.S. experienced a greater than 19% decline in overseas student arrivals this year

American is available to fill the particular role, or that making the employer pay the processing fee on the worker's behalf would undermine the country's interests. Homeland Security would also look to ensure the applicant does not pose a threat to the security or welfare of the U.S.

What may have prompted the change?

The revised fee announced in September had caused panic not only in India. Concerns centred about the fee making it "cost-prohibitive" for U.S. employers, especially start-ups and small and mid-sized businesses, to hire foreign workers. Several industry groups, including the U.S. Chamber of Commerce argued this went against the objective of the programme which was to ensure "businesses of all sizes can access the global talent they need to grow their operations" in the U.S. In fact, the Chamber this month filed a legal challenge arguing that the revised fee was "unlawful" and must be structured around actual costs incurred by the government in processing visas, not otherwise. Moreover, the complainant argues that U.S. firms, particularly in manufacturing and certain STEM fields, face a shortage in finding domestic workers "qualified and available to fill the roles needed for the company to perform". In fact, Neil Bradley, Chief Policy Officer at the U.S. Chamber of Commerce, in a blogpost, mentioned the U.S. education system has "not kept pace with the needs of businesses in this global economy". Reflecting on an "entrenched opposition to change", among other things, he writes, "Our nation's failing report card in math and sciences forces business to create their own programmes to address these challenges," he stated.

The H-1B proclamation announced in September has already had an impact on arrivals to the country. Preliminary data of the U.S. International Trade Administration (ITA) points to a 44% decline on a year-over-year basis in student arrivals from India for August this year. Overall, the U.S. experienced a greater than 19% decline in overseas student arrivals.

Does this open doors for Indian students?

Ajay Srivastava, founder of the India-based

Global Trade Research Initiative (GTRI), told *The Hindu* that the exemption for foreign students removes a "major financial hurdle at the start of their careers". He elaborates this would allow for a smoother movement from education to employment without the risk of or cost of leaving the country. However, Mr. Srivastava apprehends the decision earlier this month to cap international student admissions (for undergrad) to 15% of total intake with 5% from an individual country would "drastically reduce opportunities for Indian students to even enter the U.S. education system". "This measure effectively shuts the door for many before they can benefit from the revised H-1B rules," observed Mr. Srivastava. The proposed cap forms part of a broader 10-point memo sent by the U.S. administration to universities seeking an agreement on a broad range of issues, ranging from foreign enrolment, faculty hiring to encouraging ideological diversity, and not just "woke, socialist and anti-American ideology".

Has confusion been resolved?

Notwithstanding the clarifications, the H-1B proclamation struggles with certain structural concerns. Speaking to *The Hindu* over email, Kate Angastia, supervisory policy and practice counsel at the American Immigration Lawyers Association (AILA), said the latest clarifications address some of the details on how the U.S. government is implementing their plan. "The USCIS update addresses when a petitioner must submit payment and what is required for petitioners. Prior to the update, these were unknown factors," she said. Although, Ms. Angastia separately underlined there could be "confusion" with regards to determining the exceptions. "There is not a clear guidance on the standards, and this is a significant departure from the statute," she states.

The proclamations, as was the case in September, fall amidst a larger backdrop advocating protectionism and strengthening inward-looking prospects, one of them being to tighten immigration. Ms. Angastia noted, "The broader environment is very concerning because U.S. businesses and immigration advocates know that the government could announce a new policy and create confusion again." Back home, the Department of Economic Affairs in their monthly review for September had observed the fee could cause "disruptions" - particularly on the growth of future remittances and service trade surpluses.



GETTY IMAGES

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The autumnal sunlight, filtering through the window curtain, woke me up from my midday nap that I have got used to in my post-retirement days. Suddenly, my attention got riveted to the scroll on the TV about the University Grants Commission taking a relook at the digital learning ecosystem to close the disconnect between education and employment. That set me thinking on a lost paradise, the classrooms which discovered, nurtured, and nourished the teacher in me for close to 50 years. Having taught English language and literature to multiple generations across Kerala, I thought it was worthwhile to explore and rediscover the ecstasies and anxieties associated with those days. Besides, it might not be out of place to reflect on the shifting scenes of the classroom dynamics, at a time when artificial intelligence is all set to revamp the teaching and learning process, and robots are getting ready to replace teachers.

Fifty years is a long period, long enough for a tectonic shift in any sphere of human activity. I started off dealing with a generation that was yet to see television. They might not have even heard of Internet, smartphone or artificial intelligence. The boys and girls, mainly from rural and semi-urban areas, were by and large simple and untouched by the surfeit of material comforts. They were traditional and had learnt from adversity.

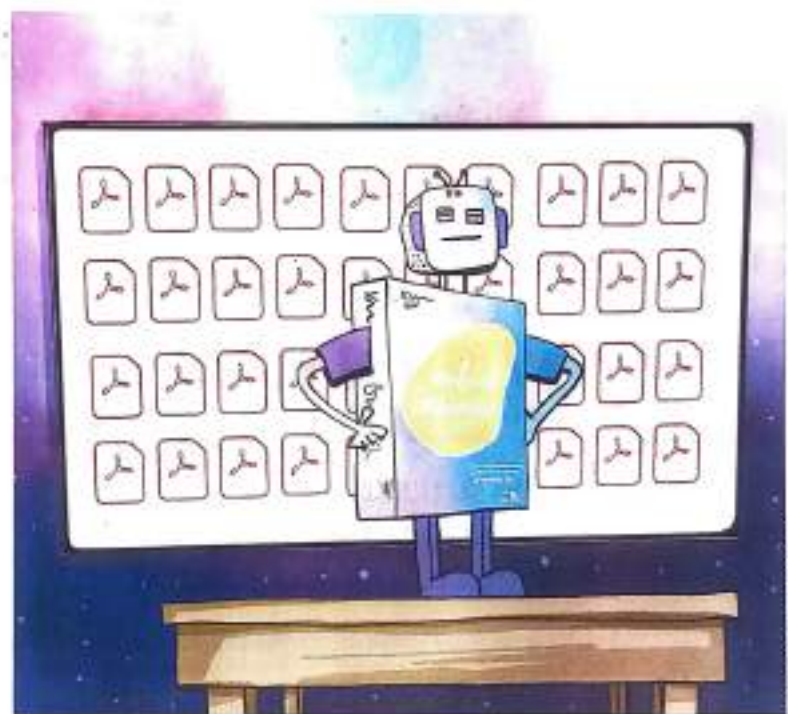
For them, information technology meant the print medium, radio, telephone, and telegraph. They came to college on foot, by bus, or on bicycles. Having done schooling in the Malayalam medium, most of them struggled to speak in English or follow lectures in the language. Convent education was not common in those days. It was a generation haunted by the spectre of Wren and Martin, the famous authors of *High School English Grammar and Composition*. Obsession with grammar adversely affected their spoken English. However, their written English turned out to be better, which might have stood them in good stead in competitive examinations. Their pronunciation and accent often revealed the influence of the mother tongue. But they were diligent, hard-working, and brimming with enthusiasm. They read and wrote avidly and made full use of the library. Evidently, they had a sense of purpose and knew well that their future depended on their academic performance.

A sea change

Resuming teaching after a few years, I found myself face to face with the so-called Gen Z. That they were netizens and tech-savvy was not enough to unnerve me, though I took pains to make myself less anachronistic. Armed with laptops, tablets, and smartphones, they

What is lost in a smart classroom

Technology enriches but dehumanises human experience; it is time to reimagine educational process with intuition, insight, and creativity



looked like the quintessential digital natives. I was all admiration for their new-fangled ways, excellent communication skills, deft handling of electronic gadgets, and devil-may-care attitude. They had exorcised the ghosts of Wren and Martin. But what shocked me was their reluctance to explore the library, the lifeline for the earlier generations. Even postgraduate students were no different. They claimed to have everything they needed in the laptop. Their concept of books and reading was shaped by technology, which might be instrumental in moulding their character and outlook to a considerable extent. There was no conventional texts; only PDFs in the class. Stanley Fish, the American theorist, would have rephrased his question, "Is there a text in the class", as "Is there a PDF in the

class?" The enticing rustle of paper and the seductive aroma of books were lost on them. I wondered how a not-so-smart teacher like me could survive in a "smart classroom". Eventually, I had to bring out the entire repertoire of my persuasive skills to convince my students that literature did not lend itself to be taught with the aid of educational gadgets. I still doubt if literature can be taught at all.

Let imagination flourish

But what is alarming is the breathtaking speed at which new forms of technology transform the educational landscape. AI and robotic devices are all set to replace teachers. We tend to repeat T.S. Eliot's questions, "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?" Technology is a double-edged sword. It enriches and at the same time, dehumanises human experience. It is high time we thought about what was lost in the classroom. We need to recalibrate and reimagine the educational process without estranging it from intuition, insight and creativity. Let the digital revolution not precipitate the demise of imagination, and let us not forget that teachers, if they want to survive in the classroom, would have to make themselves unique and do what no robot can mimic.

What is alarming is the breathtaking speed at which new forms of technology transform the educational landscape. AI and robotic devices are all set to replace teachers. Technology but is a double-edged sword

Sanil Raj Johnson

Imagine you step into an undergraduate General English classroom at a college or university in India, anticipating a new, interesting blend of literature and ideas. Unfortunately, you discover that the syllabus is firmly linked to your major subject. As a Physics student, you read articles related to Science and lab-inspired short fiction. If you are a Commerce major, you will encounter lessons about trade and business.

Meanwhile, Humanities students receive content that is more relevant to their field of study. This is the truth, particularly in Kerala's educational institutions under the new Four-Year Undergraduate Programme (FYUGP), where General English is increasingly structured to reflect the student's major specialisation.

Questions arise

On paper, this integration of language learning with subject knowledge seems logical. Yet, it raises a pertinent question: should General English, by definition, be subject-specific? Or should it remain a space for broad-based intellectual exploration, where students from different streams encounter the beauty and complexity of literature that transcends disciplinary boundaries?

Until fairly recently, General English syllabi in Indian universities were truly eclectic. Students

would read a Shakespearean and a modern play, analyse classic essays by the likes of Bertrand Russell or George Orwell, delve into an entire novel, and explore poetry across centuries. These classes offered a welcome break from the rigidity of core subjects and provided a common cultural platform where students from varied academic disciplines could debate, interpret, and appreciate texts together. Today's subject-specific approach, even when well-intentioned, risks narrowing students' horizons. It also fails to

prepare them for competitive exams and not only restricts imagination but also denies students the rare opportunity to explore literature's intellectual and emotional rewards.

Exceptions

In the meantime, there are exceptions. Delhi University's B.A. programme, for instance, includes a blend of prose, fiction, poetry, and drama in its Part I English syllabus without any tailoring to the student's main discipline. Students – regardless of their major – study short stories by

writers such as Katherine Mansfield, poems by Keats or Yeats, essays by Aldous Huxley, and plays by contemporary dramatists. Similarly, Calcutta University's B.A. General English syllabus includes *The Merchant of Venice* by Shakespeare and essays by C. E. M. Joad and G. B. Shaw, along with selected poems and a language component covering comprehension, précis, and essay writing. The inclusion of canonical works ensures that all students, whatever their background, engage with texts that have shaped the intellectual and cultural fabric

of the English-speaking world.

The philosophical foundation here is noteworthy. A broad-based General English course is not just about improving grammar or vocabulary. It is about cultivating the imagination, nurturing empathy, enhancing cultural literacy, and supporting the ability to think critically and communicate persuasively. These are not skills confined to the Humanities; they are vital in every field, from Engineering and Business to Medicine. Exposure to varied literary voices also builds emotional

intelligence, enabling students to relate to perspectives different from their own.

Less enriching

Aligning general English too closely with subject areas risks turning it into a mere extension of the major discipline. Undoubtedly, it makes the course more utilitarian, but less enriching. A well-designed general English syllabus should, instead, be a meeting ground for disciplines, cultures, and ideas where a future engineer might find joy in reading Wordsworth, or a budding economist might wrestle with the moral dilemmas in Shakespeare.

The Board of Studies in English across the country might do well to revisit the old, literature-rich models and see how they can be adapted for today. Practical communication skills – report writing, presentations, workplace correspondence – can certainly be included but should not overshadow the literary component. The aim should be a balanced course that equips students for professional communication and opens the door to the transformative power of literature. After all, literature in a general English course is not merely about mastering language; it is about expanding the mind, deepening the heart, and broadening the world within.

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The literary disconnect

Should Literature in General English courses be subject-specific?

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