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## EDITORIAL

### Indian Institutes of Technology

*'Here in the place of that Hijli Detention Camp stands this fine monument of India, I.I.T., today representing India's urges, India's future in the making.'*

Jawaharlal Nehru at IIT Kharagpur  
21 April 1956.

The Hijli Detention Camp in Midnapore district of Bengal was the place where two unarmed detainees, Tarakeshwar Sengupta and Santosh Mitra, were killed by the police on 16 September 1931. Their bodies were collected by Nethaji Subhas Chandra Bose, in one of the many poignant episodes of India's long and protracted struggle for freedom. In 1946, on the eve of independence, the Nalini Ranjan Sarkar Committee pondered on the issue of setting up 'higher technical institutions for the postwar industrial development' of India. The Sarkar Committee had a vision of four national institutions, geographically dispersed across the country, modelled on the lines of the best technical institutions in the West. In considering the standards to be maintained for undergraduate degrees, the Committee chose Manchester and the Massachusetts Institute of Technology (MIT) as examples; the choice of the former may appear curious in today's context, while few may take exception to the latter as an academic model. The IITs arose out of the recommendations of the Sarkar Committee, with the institution at Kharagpur coming into existence in May 1950. In September 1950, the IIT shifted to its present campus, the site of the Hijli Detention Camp. Almost exactly two decades after the shooting at Hijli, IIT Kharagpur was formally inaugurated on 18 August 1951. The IIT system expanded rapidly in the late 1950s and early 1960s. The institutes at Bombay (1958), Madras (1959), Kanpur (1963) and Delhi (1963) were started with foreign assistance in the early days, providing each with a distinct character, reflecting the academic approaches of the collaborating countries. In time, the IITs grew to develop a remarkable character of their own, transforming the landscape of engineering education in India. The success of the IIT experiment has encouraged the setting up of two new IITs; Guwahati, an institution being developed from scratch and Roorkee, where an existing university has been transformed by decree: an admirable act of administrative alchemy.

IIT Kharagpur celebrated its 'golden jubilee' in 2001 to mark the passage of half a century since its inception. But, in a commendable display of togetherness, IIT alumni used the Kharagpur milestone to celebrate the success of the IITs at a gathering in Silicon Valley in northern California. Ironically, the first celebration of the success of the IIT experiment was in faraway California, where many of its most successful alumni reside. Bill Gates placed his seal of approval on the IIT's academic standing and the CBS television network devoted its 60 Minutes program to featuring the IITs. For those who may be uneasy with this celebration of the success of India's foremost technical institutions, some solace may be derived from the fact that IIT alumni organized an IIT 50 event in Bangalore on 16 February 2003. A well-attended seminar on the 'Role of IITs in Nation Building' marked the occasion, with the discussion initiated by alumni representing the various sections of society into which IIT students had integrated; notably, industry, politics and academia. There was little said about alumni who had moved into areas of wide societal concern like the environmental movement in which the late Anil Agarwal played a stellar role. As an alumnus, albeit an atypical one, with a degree in science, I had the opportunity to participate; although I suspect that many of my perceptions on what the IITs have been and what they ought to be are distorted by the prism of my own long experience in the sheltered and tranquil atmosphere of the Indian Institute of Science.

The global image of the IITs quite clearly derives from the spectacular success of its alumni, who obtained undergraduate (B. Tech.) degrees in various disciplines of engineering. It is these men and some women, who have created technologies, opportunities and wealth, making the IITs synonymous with excellence in technical education. The selection process for undergraduates, through the rigorous Joint Entrance Examination (JEE), is so competitive that only about 2% of the applicants are eventually successful in entering the IITs. With the IITs becoming the institutions of choice for all aspiring engineers, thousands of students flock to preparatory coaching classes for a year or two before venturing to appear for the JEE. This method of selection ensures a certain academic homogeneity of IIT entrants, which may not be

an entirely desirable attribute in an institution of higher learning. Picked for their analytical and quantitative abilities, IIT undergraduates have proved extraordinarily successful when they have moved to fields of management, finance, marketing and business administration. Over the years, the IIT undergraduate programs have been among the major providers of highly trained technical manpower, to the advanced countries of the West. Unsurprisingly, the IIT jubilee is more celebrated in San Jose than it is in India. IIT-trained engineers have not only migrated geographically in large numbers; they have also moved away from the technical disciplines in which they were trained, in even larger numbers. In addition to the flight to business, engineers of all hues have gravitated towards 'information technology'. This 'disciplinary migration' may be of some import in the years to come.

The IITs were born at a time when the Nehruvian vision clearly held that science and technology would dominate the transformation of India. This has indeed happened; but the gains of technological advance have been neutralized by a booming population growth, with an attendant increase in economic disparities. The IITs have flourished and their alumni have been among the leaders in the transformation of at least some sectors of our economy. The IITs have established themselves as the jewels in the crown of technical education in India; they command enormous worldwide respect for the quality of their undergraduates. But, this may be an appropriate moment to reflect on the academic ethos of the IITs; to raise questions on the role of research in these institutions and to reflect on the growing gulf between science and engineering.

The great universities of the West, both in the past and in the present, have been all encompassing in the subjects they teach and research. Even the 'Institutes of Technology', Caltech and MIT amongst them, which formed the model for the IITs, have a broad mandate extending well beyond undergraduate engineering education. It is the breadth and depth of research, which is their defining characteristic. We might then ask: 'where do the IITs fit in the academic scenario in India?'. In addressing this question three models for higher education in an ambience which promotes research, may be considered. First, these are our universities, Banaras, Allahabad, Calcutta, Madras and Delhi among them, which in the early years after independence produced much of the academic output of this country. Secondly, we have predominantly post-graduate research institutions, IISc being preeminent. Finally, there are the IITs. I deliberately omit a growing number of specialized national research laboratories, which have donned the mantle of deemed universities. The three classes of institutions that I list have unique characteristics of their own. But, their status today must be a matter of national concern. The universities have decayed; engineering, science and the humanities have fragmented. The universities which I explicitly list

can look back on an historic past, when this country's intellectual resources emerged from their classrooms. They were centres of teaching and research. We must not forget the remarkable engineering departments that grew within our university system; metallurgy in Banaras and chemical engineering at the University Department of Chemical Technology in Mumbai are two examples, which immediately spring to mind. The universities are in a difficult situation today; a matter of concern for the hundreds of thousands of students, who cannot enter the IITs or who wish to pursue disciplines other than engineering.

This may not be the moment to dwell on another model, the Indian Institute of Science (IISc), which is slowly approaching its centenary year. Here engineering and research coexist in an ambience which promotes research. The focus on postgraduate and doctoral degrees differentiates IISc from the IITs, although at some IITs research occupied a more honoured position in the early days of their existence. The jubilee celebration may be an opportune moment for the IITs to reiterate their commitment to research. Thus far the IITs have emphasized quality undergraduate education in engineering. Their success has been predicated on two factors: rigorous selection of students and a proven recipe for training. It is however a matter of some concern that even as the 'brand equity' of the IITs, a term undoubtedly coined in marketing circles, has risen, the country's scientific research output appears to be levelling. And, here I use the word 'science' in its broadest context, encompassing all areas of science and engineering.

Anniversaries and jubilees are useful. They allow us to look back and, sometimes, even prompt us to look ahead. For the IITs this may be a good time to consider emphasizing postgraduate education and research and to lower the rising barriers between science and engineering. There are some welcome signs of change. Biology, long excluded from some IIT campuses has begun to take root. Many of tomorrow's technologies will be seeded by basic research in biology and it is fitting that the subject is introduced at our best technical institutions. The real drivers into the future will be the men and women, who serve on the faculty of these institutions and chart their course. Recruitment policies and programs for promoting research will be critical in these new areas. The growing interest of alumni in the institutions which nurtured them is a heartening sign. The IITs have produced many leaders of business, technology, commerce and government. If some of them were to reflect on the importance of shoring up our academic institutions and chart a course of action, we might begin to see the contours of a renaissance emerge; an academic awakening on a broad front, which would indeed address the theme which the Bangalore meeting wished to consider - 'the role of IITs in nation building'.

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