The IITians

This book is about the Indian Institutes of Technology (IITs) possibly India's greatest institutions of higher learning. Getting admission to the IITs is the dream of all aspiring engineers in the country. This book provides a fascinating account of the IITs, including an inside view of what life is, after one gets admission.

The setting up of the IITs

In March 1946, a twenty-two-member committee headed by Nalini Ranjan Sarkar submitted an interim report titled the Development of Higher Technical Institutions in India. The committee recommended that at least four such institutes should be set up, one each in the east, west, north and south. The IITs were created on the basis of this interim report. The Sarkar committee, in fact, never submitted a final report! The All India Council of Technical Education (AICTE) decided to operate on the basis of the interim report. The Indian Institute of Technology Act was passed by Parliament only in 1961. By that time, five IITs had been set up and were fully functional.

IIT Kharagpur was inaugurated in 1951, IIT Bombay in 1958; IIT Madras in 1959; IIT Kanpur in 1960; and IIT Delhi a year after. Unlike Kharagpur, the other IITs received significant foreign technical and financial assistance. The foreign assistance included funds for equipment, guest faculty from donor countries and fellowships to faculty members for advanced research and training.

Reasons for success

Though Sarkar and his colleagues drew heavily from practices and programmes in Machasussets Institute of Technology, (MIT), the best technological institution in the world, they also modified them quite significantly to suit Indian conditions. For example, 300 hours were proposed for the final year thesis, as opposed to MIT's 120 hours. The IIT students were also expected to spend far more time on practical training than at MIT, where there was no workshop practice. In IIT, students would have to sweat through hundreds of hours of filing, forging and welding metal. One reason for this emphasis on practical training was to drill the concept of the dignity of labour into the heads of all IITians. For example, under the guidance of one professor of the civil engineering department, IIT students dug the pool, poured the concrete, did everything just like construction workers.

Creativity was another focus area for the designers of the IIT system. The aim was to develop an academic programme that would encourage Indian students to think creatively. The products of these institutions were expected to be 'creative scientist engineers', technical leaders with a 'broad human outlook' and individuals with 'creative initiative in future situations'.

The organizational structure of the IITs also contributed to their extraordinary success. 'The IIT Act is one of the best Acts ever passed by the Government of India,' according to Professor P V Indiresan, a highly respected academician and former director, IIT Madras. 'It gives total autonomy to the IITs. This is unique among all Indian educational institutions.' In the absence of power brokers within the board, discussions can take place, and do take place, in an objective manner. So decisions are, by and large, more rational than they would be in the presence of politicians and bureaucrats. Also, the absence of government officials places an onus on the members of the board to decide as responsibly and as objectively as possible.

Deb gives an example to put this in perspective. At India's top medical school, Delhi's All-India Institute of Medical Sciences (AIIMS), the committee that selects deans does not have a single doctor on it! It consists only of bureaucrats and the Union minister in charge of health.

In the IITs, the director is appointed by the board, which has a chairman who is neither a politician nor a bureaucrat. Once a year, the finance member, who is a bureaucrat from the education ministry, comes and announces the year's budget. It's then up to the IIT director and the management to decide how they intend to spend the budget, and the government has no further say.

The IITs are free to choose their own syllabi and educational methods. They are also free to pursue excellence as they deem fit. Many of the IIT faculty are seriously engaged in research. IITs are open twenty-four hours a day. Even at two on wintry mornings, dozens of bicycles in the foyer remain mute witness to the fervour with which somebody or the other remains at work.

Finally, whatever complaints the faculty or other staff may have, they are all proud to be associated with IITs. The way the faculty strive to maintain the integrity of the test should be seen to be believed.

The Joint Entrance Examination
In the early days, IITs did not have an entrance examination. They admitted students on the basis of their academic record and an interview. The first batch of IIT students consisted entirely of boys who had been among the top ten rankers in their universities. Later, the concept of the now well-known Joint Entrance Examination evolved. The JEE, as it has come to be known is one of the most prestigious examinations in the country and possibly in the world today.

The brief given to the paper-setting team every year is to have, as far as possible, original questions in the papers. The JEE process also attempts to ensure objective evaluation. It tries to stamp out any deviation through a second team of examiners who do random checks of the graded papers. They go through one in ten papers to check

the uniformity of evaluation. If they find that an examiner has deviated from the process, his papers are checked again and re-graded.

Deb argues that this is the most that any system can do to maintain fairness, unless an objective-type multiple-choice format is chosen for the entire examination. But there are clear limitations with a multiple choice format. Open ended questions are superior when it comes to testing the creativity and IQ of the students.

But Deb admits the ability to separate out the truly intelligent is getting eroded. When he joined IIT in 1980, he had studied for a year – a few people for maybe two years. Today, it is very common, for boys and girls to spend three to four years preparing for the exam. Also, 60 per cent of the students who make it to an IIT nowadays are doing so on their second or third attempt. The author raises a question pregnant with answer. Is the person who is getting admitted on his third attempt of the same caliber as someone who cracked it the first time round?

Another concern is that someone who has spent five years, from the ages of 15 to 19, madly slogging to get into an IIT, to the exclusion of every other activity, would be a somewhat unidimensional person, with only the ability to study and solve a certain specific range of problems. A young man of 19, who has not seen a film for five years, read a storybook for five years, seen very little television for five years and has never tried to woo a girl is likely to have a low awareness of the world around him and how it functions, low social skills, minimal leadership ability and not too much aptitude for creative and innovative thinking. And as Deb correctly points out, these are the skills needed to succeed in business.

The fallout of the intensity of the JEE preparation process across the country is that the professors who set the papers for the JEE have to try constantly to stay one step ahead of the coaching classes. And this is becoming progressively difficult. The coaching classes have built up vast banks of questions and problems that have been asked or can be asked in the JEE.

The author quotes Professor Indiresan: 'If I had my way, I would scrap the JEE in its present form, because it has become a trainable exam. As long as one has the stamina, and does not get bored, you can get through the JEE." At the same time it is difficult to see how the JEE can be done away with. Indiresan admits that if the JEE is scrapped entirely, there could be political interference in IIT admissions and that would be disastrous.

One way to resolve the problem could be to reduce the pressure on the candidates taking the JEE by increasing the number of seats. In the US, for example, it is easier to get admission into a top engineering college, compared to the IITs but that has not led to any dilution in academic standards. According to Nandan Nilekani, managing director, Infosys Technologies, 'Today, the ratio of the number of applicants to the

number the IITs take in is crazy; it's nuts!'..... 'If I were to sit for the exams today, there's no way I would be able to get in. No way! I find it criminal that in a country of one billion people, we have only 2,500 IIT entrants every year. The National Institute of Singapore has 32,000! Most American universities have 30-40,000 students! Crazy! I mean, what is going on?'

The Alumni
There were an estimated 125,000 IITians in the world in 2004. Around 35,000 of them were in the United States. About 15-20,000 more were scattered around the globe, and the rest were in India.

Over the years, IIT alumni have risen to very senior positions in the corporate world. In the early and mid-1990s, many IITians began to make their mark even in the west. IIT Delhi alumnus Rajat Gupta became the worldwide managing director of McKinsey & Co, Victor Menezes from IIT Bombay became co-CEO of Citibank, Rono Datta from Kharagpur and Rakesh Gangwal from Kanpur took charge of two of the world's largest airlines, United Airlines and US Airways respectively. Arun Sarin from Kharagpur became president of AirTouch. Later, he became CEO of the largest cellular service provider in the world, Vodafone. In each case, they were the first non-American born managers to reach these positions.

The IIT alumni have excelled in all spheres of life. Some like Jayaram Ramesh are in politics. A few have been successful managers in public sector organizations. Others are in academics. Quite a few are entrepreneurs. Others head venture capital organizations in places like Silicon Valley.

The IIT training
What are the attributes one can find in an average IITian? Two of the common answers one gets are: the ability to take enormous stress, and great discipline in project or deadline-driven situations. Whether he paces his work out to meet a project deadline, or leaves it all till he cannot avoid it any longer, the average IITian is confident that he can meet any deadline that he can deliver.

But in some areas, the IIT training leaves some gaps. In the world of business, one has to convince people that his or her solution is the correct one and the best one. One has to carry one's peers and colleagues along. It's sometimes a rude shock for the IITian, when he learns that in the real world, pure intelligence often plays second fiddle to being street smart.

As the book points out, every problem in every IIT test paper gives you five variables and five equations. By solving the equations, the problem is solved. But real life problems are rather different. There may be more variables than equations. Americans sometimes complain that IITians have great analytical skills, and are very hard-working, but there's no synthesis.

But it would be wrong to say that IITs do not provide training in managerial skills. These skills are imparted outside the classroom. The area where the IITs seem to score over most other educational institutions in the country is extra-curricular activities. On the cultural side, one can take part in theatre, debating and elocution in various languages, one can dabble in eastern and western music, start one's own rock band, join the photography club, take part in quizzes, paint, do almost anything that you had a talent for or interest in. A sports stadium, cricket, hockey and footfall fields, tennis courts, swimming pool and a gymkhana with a badminton court, table tennis tables and gymnastics equipment are de rigueur in IITs. The student can participate in nearly any outdoor or indoor game one can think of. The inter-IIT meet is the sporting high point of the year, with the institutes competing against one another. Within each IIT, inter-hostel tournaments are fiercely contested.

Like many Indian colleges and universities, each IIT has its yearly cultural festival, when other colleges come to showcase their talent. In western India, IIT Bombay's Mood Indigo is the most prestigious and high-profit inter-college cultural competition. In eastern India, it is Springfest at IIT Kharagpur. In the south, it's Mardi Gras (now renamed Sarang, since Mardi Gras was seen as too western a name) at IIT Madras. And so on.

These IIT festivals have the largest budgets among all Indian college festivals. The funding comes primarily from corporate sponsors. Students manage these festivals on their own, picking up far more effective and practical lessons in management, leadership and teamwork than any business school course. According to Nandan Nilekani, who was general secretary at IIT Bombay and organized two Mood Indigos. 'Just to be with all those awesome people on the campus, the confidence you get from interacting with all these high-calibre people, the bonhomie and camaraderie, the management skills and street smartness you get from organizing various events, this is all great education.'

The author emphasizes throughout the book that there is a high correlation between an IITian's success in life, and his ability to balance academics and extra-curricular activities on the campus. There would possibly be an even higher correlation between career success and participation in extra-curricular activities. Also, it is quite likely that an IITian who rose to be a CEO or top manager, without having done an MBA, would have been an elected office-bearer in student activities in his IIT days. The hurly-burly of the campus elections, where one stands for a post purely on personal stature and tries to convince electorate of exceptionally bright people that they would be better off under his leadership, is an education in marketing, motivation, leadership, and management. Deb feels that someone who successfully contests the elections, can legitimately claim to be prepared for the complexities of corporate life.

Concerns

Attracting and retaining good faculty is the single biggest problem facing the IITs today. Research output is a critical indicator of faculty quality. Here, the IITs fall woefully short of global standards. Between 1993 and 1998, while the number of citations per faculty member (which attests to the quality of papers being written) for MIT was forty-five, and for Stanford's engineering school fifty-two, a typical IIT professor could hope for only two or three. In 1996-97, 102 patents were granted to MIT professors and students. The number for a typical IIT was between three and six. Industry interface also leaves a lot to be desired. It is difficult to imagine the IITs fostering a Silicon Valley kind of industrial cluster as Stanford did.

The solution, the author points out based on his discussions with well wishers of the IITs is to have them run as autonomous educational institutes, with strong accountability and performance evaluation systems for its employees, and clear reward-and-punishment structures. For that, it is crucial that the IITs are freed from the government's purse strings. As one committee put it: 'Optimal utilization of resources requires institutional autonomy in all functions. This will only be possible when IITs become self-reliant or at the very least reduce their dependence on government support. Financial self-sufficiency would not only provide IITs with the ability to take independent decisions but also reduce their response time to other innovative suggestions."

The committee urged that the IITs should work towards reducing their dependence on government funds from 75 per cent to less than 30 per cent within the next three years and complete self-sufficiency by the end of the decade. It's now three years since that decade ended, and though dependence on government funds has definitely reduced, it is still about 65 per cent.

The author argues that it is the IIT alumni who must take responsibility for taking the IITs forward. After all, it is the students who are the best and the brightest on any IIT campus and who have got the most out of the IIT system. These students are the most successful products of the IITs. They are grateful and want to give back to the place that shaped their minds and gave them the confidence that he could take on the world and conquer it. Many, through their philanthropy, wield considerable power with their alma mater's management. Many are in a position to influence government policies.

Conclusion

In the final analysis, what does one get out of an IIT education? In the classroom, it grounds students in engineering basics so they can always cope with evolving technology. At a broader level, it teaches them how to learn. The campus life gives students the ability to manage the environment, indeed life itself. But most of all, the author believes, IIT sets people free to be unafraid. The true IITian is confident that no challenge is too great, that there is no endeavor that he cannot succeed in.

Sure, many IITians have not had spectacular careers and lives, but in the vast majority of such cases, they did have a choice over their direction and trajectory, far greater choice than almost anyone from most other Indian institutes.

The author is unhappy with the current repressive regime. The IITs could have never produced so many intrepid achievers in so many different fields without the freedom that they gave their students to seek out their true abilities and pursue the dreams. The powerful disciplinary system that has been imposed can only indicate two possibilities: one, that the IIT student community has become so retrograde and unruly that it has to be policed twenty-four hours a day to avoid the collapse of civil society within the campus; or, two, the current men who run the IITs have some sort of problem dealing with the fact that these boys and girls are so respected by Indian society, and believe that they should be put in their place, and kept there for the four years they spend on the campus. Both are undesirable situations.