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4Q2014

IITB-aa

IIT Bombay Alumni Association

Quarterly magazine of
The IIT Bombay Alumni Association

Contents

From the Beehive

Back in the cusp of India's independence when the IITs were conceived, the vision was to create educational institutions that would provide the nation with an elite corps of technologists who would take up the architecting of new India. While the IITs did emerge as premier institutes of technological learning, for the longest time they were also pilloried for losing the cream of their graduates to better employment opportunities abroad. The jury was divided on the accuracy of that claim even then, but that notwithstanding, the fact remains that today, 56 years after IIT Bombay was established, while students are no longer contributing to "brain drain", a large percentage still take up jobs in the non-core sector.

The issue perhaps comes into the sharpest focus in the month of December every year with the commencement of the placement season, the best time for Fundamtics to takes it up as its thematic focus. Not since Prof Sukhatme presented his empirically-researched report on the "brain drain" issue in the 1980s, have we come across such a well-researched paper as the one presented here by Professors Sohoni and Kathuria. We decided to depart from the norm and carry a more academic paper. An alternative view to Sohoni and Kathuria is provided by a piece from Prof. Ali Contractor. There is an article from the campus student magazine, 'Insight' although we are fairly sure that too only skims the surface of student responses. Few know that the entire placement process is undertaken by a group of selfless, extremely hardworking student volunteers without whom there would perhaps be no placements. Unfortunately as we go into print, the placement team is still too busy to be disturbed. We promise to follow up with a detailed in-depth perspective from the placement office in the next issue.

The editors are well aware that the complexity of the placement process is of a magnitude that cannot have any easy answers. Nor do the views and opinions expressed here reflect the entire gamut of perspectives on the debate. Continuous critical self-reflective analysis however, is what makes any educational institution reach true greatness. Our intent is not to take sides, but to widen the scope of the debate within the larger Institute community.

A common theme running across the issue, be it with the placement debate or our interviews and opinion pieces, is the concept of 'leadership' albeit in a serious, non-buzzword fashion. There are liberal doses of humor, with an excellent satire from Alibaba while *Ab ki baar,* Grumblebee has moved on from MGPL to a new estate – Moody Sarkar Unlimited (MSU) – with a completely new set of dramatis personae. There is some exceptional poetry from our resident Tinkerbee and Karthik K S S. In short, with winter well and truly here, this is just the companion you need on a lazy weekend to curl up on the couch with a steaming cup of coffee. I hope you will all agree.

Queenbee

The Elite University: Are we too selective?

MILIND SOHONI & VINISH KATHURIA

Abstract

This paper attempts a socio-economic analysis of elite institutions in India and uses employment options exercised by fresh graduates as a key indicator. We point to its implications to national objectives and development outcomes. We use IIT Bombay as a representative institution and analyse the employment data for the year 2013. Our analysis shows that most graduates of IIT Bombay do not choose jobs which directly benefit the Indian economy, nor do they prefer to work in Engineering and Technology. Merit, defined as performance at entrance examinations, rather than training, is a more decisive indicator of salaries and allocations. We argue that the definition of merit and its identification in a global economy is fraught with risk for a developing society such as ours. Finally, we make some recommendations on the way ahead and suggest a more strategic and developmental role for elite institutions.

Historically speaking, the modern university is perhaps the single most important social innovation which contributed to the overall development of modern societies. It has served as both the repository of knowledge and practices of a society and also as a trainer of its state, economic and cultural agents (Brezis and Courzet, 2004). The role of the elite university is even more crucial for it is here that the best of the state, civil society and industry converge to apprehend new challenges and to prepare for them. It is here that new practices, new professions and innovations emerge which help society make the required transition. This is the basis of the inordinate influence that elite institutions have on the culture and vision of a society.

Elite institutions of higher education and research have assumed significant importance in post-independence India. These span many areas of knowledge, ranging from engineering (the IITs), management (IIMs), physical sciences (IISc and the recently formed IISERs) to the social sciences (JNU, DSE).[1] All these institutions have prided themselves on their autonomy, research atmosphere, a transparent and competitive admission procedure, a focus on excellence and on global standing.[2] While these institutions and their graduates have flourished, there is a vast majority of educational institutions whose research output is of dubious quality, and whose graduates are frequently found "unemployable" (see As-

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1   These acronyms stand for the Indian Institute of Technology, Indian Institute of Science, Indian Institute of Science Education and Research, Jawaharlal Nehru University and the Delhi School of Economics respectively.

2   Despite obvious limitations of different ranking systems, which are often biased against developing countries institutes, these institutes have often figured in top 200 to 300 institutes of the world in their respective fields. A brief discussion on ranking of different IITs and the limitation of such ranking is given in http://www.insightiitb.org/2013/world-university-rankings-with-a-pinch-of-salt/ (accessed in Jan. 2014).

piring Minds, 2011 for a survey of suitability of engineers for information technology (IT) jobs, and also Chapter 5 of the World Bank Report, 2012). Thus we see a sharp distinction and wide chasm between the elite universities and their not-so-elite cousins.

The elite universities, though funded generously by the Govt. of India (GoI), form a miniscule fraction of the overall budget of the Ministry of Human Resource Development (MHRD). It is however the intellectual space over which these institutions have an almost total monopoly.[3] In engineering and physical sciences, they administer the key admission tests of JEE, JAM and GATE[4] and key scholarship programs such as the Kishore Vaigyanik Puraskar Yojana (KVPY).

Indeed, the IIT student is the role model for most students preparing for higher education in India. The World Bank funded TEQIP-II project talks of the "gap" between the IITs and other engineering colleges and of actions to close this gap. Faculty members from these institutions are on most selection and award committees and control much of the research funding. They also serve on expert committees advising the government on policy and programs, see for example, the memberships of the Scientific Advisory Council to the Prime Minister, or the Science and Engineering Research Board, among others.

Given their substantial influence in the

conduct of higher education policy and practice, it is but natural that their contributions be analysed, both in research and in training. Clearly, the graduate of an educational institution is its primary output and the student, its primary resource in the conduct of research. Thus, the career choices of these students when they graduate, forms an important outcome for the institution, and for society itself. In this paper, we analyse campus placements, i.e., job allocations of fresh graduates, for the graduating batch of 2013 at IIT Bombay (IITB). Based on the outcomes of this analysis, we offer a perspective on possible connections between this and the economic and development outcomes in India.

Our analysis shows that most graduates of IITB do not choose jobs, which directly benefit the Indian economy, nor are they in the field of engineering and technology (ET). Many choose to work for global companies and/or for global markets and largely in the service sector. These global service companies pay substantially higher than core ET companies and are largely oblivious to the training that these students have received. One important contribution of this paper is to show that this allocation (or misallocation) is systematic and that excessive selectivity of the JEE and GATE exams forms an important basis for this. Another likely cause is the irrelevance of elite engineering education to current Indian engineering needs and practices and thus an inability of its graduates to deliver value and command higher salaries.

On the other side, there are the long-standing economic problems in the country, such as rising inequality, poor governance, missing capacity for key development functions, a small manufacturing sector and a large and stubborn informal sector. See OECD, 2012; Kumar and Sen Gupta, 2008, for a brief discussion on these issues. The conduct of higher education has been repeatedly cited as an important factor (see for example, a recent article in the

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3   This monopoly is long standing. Aggarwal (2006) gives few examples for the decade of 2000. In engineering, in 2001-02 of the 650 doctorates awarded, 80% were from just 20-top universities. In science, 65% of the doctorates awarded were from the top-30 universities (ibid.). Similarly, a study conducted on Social Science Research Capacity in South Asia in 2002 showed that one fourth of special articles published in the Economic and Political Weekly was dominated by only three universities, namely - JNU, University's of Mumbai and Delhi (Chatterjee, 2002 as referred in Aggarwal, 2006).

4   JEE, JAM and GATE stand for Joint Entrance Examination for admission in under-graduate (UG), Joint Admission test to M.Sc. and Graduate Aptitude Test in Engineering for graduate programmes.

Economist (2013), or the World Bank Report (2012)). Our paper attempts to point out certain mechanisms which may connect the two and which starts right at campus recruitments.

In Section 1, we will begin with the actual placement data of IIT Bombay for the year 2013. We will present important features of this data, and most significantly, the allocation of students away from engineering and also away from a direct participation in the Indian economy. In Section 2, we delve deeper into sectors and argue that an important attribute of the mis-allocation is the selectivity or merit[5] of the JEE and GATE examinations used to admit students into IITB. The key point is that this merit seems well in excess of what can be utilized by Indian companies and agencies, especially those engaged in engineering. In Section 3, we present mathematical models which illustrate some of the outcomes of excessive merit, especially in the presence of a global economy. We use the formulations of Kremer and Maskin (2003), and of Stiglitz (1975). We show that in this model, excessive merit does lead to rents and economic inefficiency for the less developed society. We point to certain connections of this mechanism with the current Indian economic situation. In Section 4, we adapt from Stiglitz's work and define a meritocracy and argue that the current Indian higher education scenario fails this definition. We examine current rationales for the conduct of higher education and their suitability. We show that abstract notions of merit and upward compatibility dominate this thinking as opposed to a downward accountability to social outcomes. We argue that mis-allocation and poor relevance are consequences of this approach and has led to poor outcomes. Finally, in Section 5, we suggest a way out by posing a set of research questions and recommending actions.

1. Placements at IIT Bombay

The first set of the Indian Institutes of Technology's (IITs) were started in the 1950s to address India's growing needs for sophisticated technologists and engineers. Since then, the IITs have shaped the conduct of engineering pedagogy and research to a large extent (see Sohoni, 2012 for a fuller discussion) and dominate the rankings of India's engineering colleges. They have also received and continue to receive generous funding from the MHRD[6] and from the Department of Science and Technology (DST), and other agencies of the Govt. of India (GoI), which are well in excess of any other institute, private or public, in the country. At the undergraduate (UG) level, the entrance to the IITs is now through an exam called the JEE (Advanced) in which about 0.15 million pre-selected students compete for about 7000 seats together for the 4-year B.Tech. program and the 5-year Dual Degree (DD) program, at the 15-odd IITs. The assignment of disciplines and programs are based on choices expressed by successful candidates and this allocation is done on the basis of ranks. For IIT Bombay, the so-called closing ranks in 2013 for B.Tech. (Computer Science and Engineering) was 59, for B.Tech (Electrical Engineering) was 135 and the lowest closing rank in engineering at IIT Bombay was 3057 for a "dual-degree" in Metallurgical Engineering. The pre-selection itself is based on scores in a JEE (Mains) examination for which 1.2 million students sat in 2013. Both exams are in the form of objective type tests in Physics, Chemistry and Mathematics held across the country on specific dates.

Thus, selection to the IITs represents

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6   In 2009, the operating revenue of IITs was Rs. 942 crores, which increased to Rs. 1283 crore in 2010 and 82% of which came as grants from MHRD. Estimates suggest that against expenditure of 8-9 lakhs per B.Tech. student, the tuition fee is only Rs. 2 lakhs and rest is borne by the government (Source: Indian Express, Sep. 20, 2011).

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5   Merit is the term used by the IITs in announcing their JEE admission rankings.

stupendous odds of about 1:200, making it possibly the most selective exam in the world. The JEE (Mains) is also used to admit another 7000 odd students to the 30 National Institutes of Technology's (NITs), which form the next rung of technical institutions.

At the graduate (PG) level, the entrance is conducted through a discipline-wise exam called the Graduate Aptitude Test in Engineering (GATE). For this exam, roughly one million students sit for about 5000 PG level seats at the IITs, again with odds of roughly 1:200. This exam is also an objective type exam on a loosely prescribed curriculum for each engineering and science disciplines and a few other streams. While the JEE is an admission test, the GATE is nominally a qualifying examination and MHRD fellowships are tied to qualifying GATE. GATE score cut-offs are used to decide and rank students for admissions into the M.Tech. programs.[7] Most entrants to the M.Tech. program are graduates of non-IIT institutions. In general, the B.Tech. program is preferred over the Dual-Degree (DD) program and both are considered more prestigious than the M.Tech. program.

Given this selectivity of admission and an outlay of nearly Rs. 10 lakhs per year per student by the state, it is important that we analyse the benefits of this exercise to the Indian economy. We begin by analysing placements and classifying job allocations by sectors and segments of the economy. Our data is for 2013

and is sourced from the Placement Office, the official manager of placements at IIT Bombay. The placements are a year-long process and our data is as of April 2013, by when more than 90% of the year's placements had been made.

For this study, we consider the graduates of all the main disciplinary engineering departments of IITB, viz., Aeronautical and Aerospace (A), Chemical (CHE), Civil (C), Computer Science and Engineering (CSE), Electrical (EE), Mechanical (Mech.) and Metallurgical (Met.), and in these, the three main programs of B.Tech., DD and M.Tech. From this list, we have excluded the 5-year and 2-year Masters in Science (M.Sc.), Design (M.Des.) and Doctorate (PhD.) etc. for which the training and orientation of students are different. We have also excluded departments/centers such as Energy Science and Engineering, Environmental Science and Engineering and so on, which are either specialized and/or only for graduate students. This makes a sample of 833 (81%) placements out of a total of 1066 placements done by the Placement office. The total number of students who applied for placements was 1421. More details on the placement process and aggregate data is available in the official placement report for 2013 (IITB, 2013).

In our sample of 833 students, 324 (39%) are B.Tech., 180 (22%) are DD and 329 (39%) are M.Tech. A detailed break-up with average annual salary in Rs. lakhs is given in Table 1. We see that the salaries roughly follow the

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7 Of late, several public sector units (PSUs) are also using GATE score to shortlist candidates for recruitment.

Table 1: Detailed number-wise break-up and average annual salary in Rs. lakhs

PROGRAM	AERO.	CHEM.	CIVIL	CSE	EE	MECH.	META
B.Tech	9 (8.6)	45 (9.5)	57 (7.6)	65 (33.4)	48 (15.5)	65 (10.2)	35 (7.4)
DD	21 (11.6)	32 (11.0)	11 (8.4)	@	44 (16.4)	46 (11.2)	26 (8.3)
M.Tech	11 (5.9)	17 (6.7)	28 (4.8)	93 (14.8)	98 (9.7)	50 (8.0)	32 (7.3)

Note: @ - CSE does not has a dual degree programme; DD – Dual Degree.
Source: Own computation from IIT Bombay placement data

Table 2: Job and company profile label

LABEL	DESCRIPTION	LOCATION	EXAMPLE
Super-GG	Globally owned, global revenues	Abroad	Sony, Japan
GG	Globally owned, global revenues	India	Goldman Sachs
IG	Indian owned, global revenues	India	Infosys, TCS
GI	Globally owned, Indian revenues	India	Proctor-Gamble, HUL
II	Indian owned, Indian revenues	India	Tata Motors

JEE closing ranks, pointing to a connection between student programs and salaries (rather than, say, relative academic strengths of departments). As can be seen from the table, average salary of a B.Tech. graduate in CSE is highest, followed by the EE graduate and the lowest is that of Metallurgical Engineering graduate. Similarly, B.Techs get on an average much higher salaries than DD students who in turn, earn more than M.Tech students – a reflection of the initial pecking order (i.e., the merit).

Sector and Company Attributes

For each job profile, along with the annual salary, we adopt the following two attributes. The first one is the sector, where we group the jobs into seven broad sectors: Consulting, Education, Engineering and Technology (ET), Finance, Consumer goods (FMCG), IT and finally non-IT Services. Clearly, the most relevant sector to IITB's mandate and training is ET. The second attribute classifies the job location and company profile as in Table 2. The classification is based on company ownership, markets in which it operates[8], and finally the location of the fresh recruit. Based on the second attribute, we can classify the firms into five categories, viz., (i) owned by Indian nationals and most revenue coming from local, i.e., Indian markets (II), (ii) owned

by Indian nationals but significant share of revenue coming from global market (IG), (iii) foreign-owned but with revenues largely from Indian markets (GI), (iv) foreign-owned with most revenue from global market (GG)[9], and finally (v) foreign firms for global markets with off-shore location (Super-GG). Each of the attribute has a different implication for our economy. For example, broadly speaking, the social returns to students placed in Super-GG or GG or IG accrue outside the society that has incurred expenditure in training the student.[10] On the other hand, social returns of students placed in II and GI companies accrue to the Indian society. Placement in GI companies may enable the transfer of technology to the Indian economy as techniques and practices employed elsewhere may be applied to local settings[11]. The two attributes of sector and company-profile, and the annual salary, will be used to analyse the placement data set.

With the above classification of job profiles

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8 We used web-sites of different companies and other published information to find out their markets.

9 All globally owned firms, though get most of the revenue from global market, but given the location of placement offered, we could decide whether it is meant for local operations or for global operations.

10 It can be argued that the returns have to be seen over a longer time horizon. In that case, we need to also see remittances of those employed by super GG. This requires studying a cohort of students employed by super GG and tracking their employment over the period, which is beyond the scope of present study.

11 There is a large body of literature which talks about the role of employees in transferring this technology. See for example Kathuria (1999) for an evidence of this role in Indian machine tool industry.

Table 3: Sector-wise allocations (in %) for the 3 programs and average annual salary in Rs. lakhs

SECTOR	ET	FINANCE	CONSULTING	IT	FMCG	NON-IT	EDUCATION
B.Tech	22 (10.2)	24	(13.0)	21 (13.2)	24 (23.2)	6 (10.0)	2 (15.0)
DD	24 (10.0)	24	(13.2)	26 (11.6)	14 (12.9)	9 (12.1)	3 (16.4)
M.Tech	51 (8.6)	4	(9.4)	10 (5.6)	29 (15.0)	2 (6.2)	1 (11.0)

and of sectors, we arrive at the following two tables. Table 3 presents the percentage of students in each program taking up jobs in the given sector, along with their average annual salaries in Rs. lakhs. For jobs which are placed abroad, nominal exchange rates as on July 30, 2013 have been adopted. Table 4 presents the allocation by various job profiles, i.e., of company ownership, principal market and location of job.

Based on these tables, we make the following observations.

1. For all programs, and across all (major) sectors, Engineering (ET) is not only the least paying but also the salaries decrease with an increase in the number of years of training, i.e., from B.Tech., DD to M.Tech.

2. Only about a quarter of the UGs and about half of the PGs take-up engineering jobs[12]. This accounts for about 33% of the total number placed.

3. Global companies serving global markets (GGs) employ more than 60% of all graduates placed and pay more than

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12 It is well acknowledged that the engineering companies often are not able to match the salaries of finance and consultancy companies. This is not unusual given the fact that the value addition is much higher in services than in manufacturing, and the remuneration goes accordingly.

75% of the total annual salary awarded to graduates.

4. About 10% of all graduates recruited are placed abroad in GGs.

5. Except for DD students placed abroad or in IT, M.Tech. students receive less on the average than UG students. B.Tech.'s are preferred for serving global markets while DDs are preferred for Indian markets.

6. Indian companies serving global markets (IGs) pay the least and are not a major employer of IITB graduates.

7. The profile GI, i.e., global companies working for Indian markets, employs about 8.3% of the total number of students placed and about the same fraction of ET jobs. Thus, companies which possibly transfer technology to the Indian economy, employ a relatively small fraction of graduates.

8. Indian companies serving Indian markets (IIs) employ about 18% of IITB graduates and yet pay only about 10% of the total annual salary received. These jobs pay the least across all profiles, barring the IGs.

These observations lead us to two important issues, viz. :

• Misallocation – Placements seem to allocate graduates away from engineer-

Table 4: Profile-wise allocations (in %) for the 3 programs and average annual salary in Rs. lakhs

PROFILE	SUPER-GG	GG	IG	GI	II
B.Tech	15 (46.8)	41 (10.8)	14 (7.1)	9 (10.6)	21 (7.3)
DD	8 (34.7)	57 (10.4)	7 (6.8)	9 (11.0)	19 (8.7)
M.Tech	7 (38.7)	56 (8.8)	16 (6.4)	7 (8.2)	15 (6.1)

ing (jobs) and also away from companies which serve Indian markets[13].

- Limited Relevance – Secondly, the high paying sectors are Finance and Consulting, and to some extent IT, and these require fairly generic skills which are largely unrelated to the technical training that these students have undergone.

Both these issues point to a market failure which is important for two reasons, viz., (i) the loss in social outcome and (ii) the impact on the conduct of academic work of the institution. More precisely, this puts students' interests/preferences at odds with the institute's mandates (as, for example, listed in the IITs Review Report of 2004) and the research interests of its faculty members. This is especially worrisome for a publicly funded research institute.

2. The wage model

Our next objective is to perform a more nuanced analysis of the allocation data eventually leading to a wage-curve, i.e., a relationship between skills, sectors and wages. We will identify the main sectors of employment and

try and isolate the key skill which resulted in the specific job allocation. We will base this on a simple theoretical model which incorporates both competition and allocation. Many authors have looked at college level 'selectivity' and its influence on future earnings of students. See for example, Dale and Krueger, 2002, Brewer and Ehrenberg, 1996 and studies cited therein which look at cross-institutional comparisons. Our specific analysis is on the influence of selectivity within an institute and is novel.

Following Stiglitz (1975), let us consider an educational institution as a labelling device, as one which labels each graduate x with a single numeric label $\theta(x)$, with the assumption that $\theta(x) > \theta(y)$ generally implying that x is more skillful or more productive than y. A firm is a collection of employees and the productivity of the firm may be a composite function of its employees. One measure of the productivity of a firm X is the mean labour productivity, $\theta(X)$ which is the mean of the labels (x) of all its employees, i.e., $\theta(X) = (\sum \in X \theta(x)/size(X))$. Analogously, we define the mean wage of all employees of X and denote it by $s(X)$. For a particular sector S of the Indian industry, consider the collection of tuples $\{\theta(X), s(X)\}$ $X \in S$.

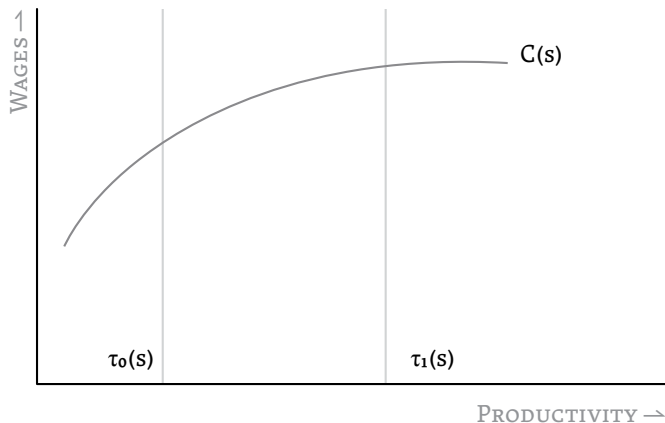13   This misallocation has been reported by others also, see for example, Anant, 2011 for IIT Madras.
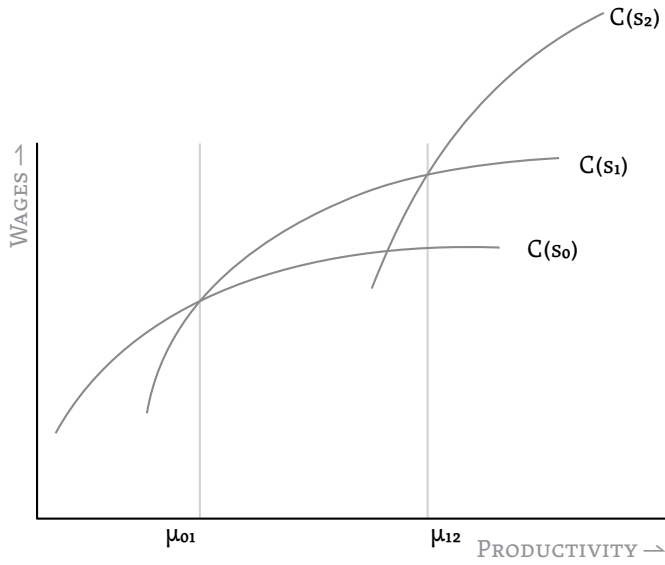

Figure 1: Wages vs. Productivity for a sector

Figure 2: Wages vs. Productivity for many sectors

This collection of points may be plotted on a graph and abstracted by a curve C(S) as given in Figure 1. An important feature of the curve C(S) is the productivity numbers $\tau_0(S)$, below which the sector will not hire, and $\tau_1(S)$ above which the sector fails to marginally reward higher productivity. The existence of such a number $\tau_1(S)$ is a reasonable expectation and is generally a measure of the sophistication of the sector[14]. It is also expected that employees with productivity above $\tau_1(S)$ and yet working within the sector, represent the

surplus productivity in the sector which contributes to innovation and an overall upward movement in the curve C(S) of the sector.

Suppose three sectors S_0, S_1 and S_2 compete for the same set of prospective employees. Given their sector curves C(Si), the crossing points μ_{ij} are particularly important. See for example the situation of Figure 2. It is clear that graduates with labels $\theta < \mu_{01}$ will find employment in S_0, while those with $\mu_{01} < \theta < \mu_{12}$ will prefer S_1 and those with $\theta > \mu_{12}$ will find S_2 most attractive.

We also note that in the figure $\mu_{01} < \tau_1(S_0)$, while $\mu_{12} > \tau_1(S_1)$. Thus, we expect productivity growth in S_1 but not in S_0.

We apply this to our dataset. From Table

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14   Not only sophistication, from efficiency wage theory, we know that it also depends on ownership of the firm. A foreign firm to avoid adverse selection, moral hazard and cost of rehiring tend to pay high salaries for higher τ.

Table 5: Placement (No.) by sector and profile and average annual salary (Rs. Lakhs)

SECTOR	ET	FINANCE	CONSULTING	IT	FMCG	NON-IT	EDUCATION	TOTAL
Super-GG	25 (27.7)	10 (35.0)	7 (54.0)	42 (51.3)	-	-	-	84
GG	140 (11.3)	92 (14.2)	117 (12.2)	144 (22.0)	-	6 (22.0)	2 (7.0)	501
IG	54 (6.5)	19 (7.2)	11 (5.8)	28 (7.2)	-	-	-	112
GI	25 (10.1)	10 (14.2)	10 (5.2)	5 (9.3)	20 (11.0)	-	-	70
II	64 (6.5)	13 (9.5)	8 (5.8)	22 (7.9)	19 (9.8)	6 (8.5)	18 (4.7)	150
TOTAL	283	134	146	199	39	12	20	833

Note: Shaded sectors are those which have hired more than fifty students.

Table 6: Sectors and salaries

SECTOR	NUMBER	SALARY (RS. LAKH)
Super-GG	84	42.5
Finance (GG)	92	14.2
IT (GG)	102	10.0
Consulting (GG)	110	9.6
ET (GG)	116	7.9
ET (IG)	52	6.5
ET (II)	64	6.5

Table 7: Rankings in selectivity

RANK	CODE	PROGRAM
6	B(CSE)	B.Tech. (CSE)
5	B(EE)	B.Tech. (EE)
4	D(EE)	DD (EE)
3	B(ME)	B.Tech. (Mech.)
2	DD(O)	DD (Rest)
1	B(O)	B.Tech. (Rest)
3	M(CSE)	M.Tech. (CSE)
2	M(EE)	M.Tech. (EE)
1	M(O)	M.Tech. (Others)

5, we see that there are six key sectors which hire 50 or more students. Besides these six, we include super-GG category, as it too has hired more than 50 students. These account for 610 (73%) of the 833 placements. Table 6 orders these sectors in decreasing order of salary.

Attributes of Productivity – Merit & Training

The productivity of a potential employee has several attributes – some readily observable and others non-readily observables, as identified in the literature (Bravo et al. 2012). Work ethics, motivation, maturity, decision-making skills, people skills etc. are some of the non-readily observables attributes. On the other hand, academic achievement, recommendations, undergraduate or post-graduate education, leadership experience, sports or extra-curricular participation are some of the observable attributes (ibid.). Among the observables, we pick two key attributes of graduating student – a) selectivity or merit, i.e., a measure of her skills before she joined the institution, and b) training, i.e., the skills that she acquired while at the institution. We classify selectivity for UGs and PGs separately by their joining discipline and program. The rankings for these are given in Table 7, with the higher number signifying higher selectivity

or merit[15]. We have followed JEE rank closings except for the last two categories, viz., B.Techs and DDs for departments other than CSE, EE and Mechanical Engg. The reason for this will soon become clear.

One important attribute of the training is the Cumulative Performance Index (CPI), which is a number between 0 and 10 and is a weighted linear combination of a student's grades across her coursework. A grade lower than 4 in a course is a fail grade while the maximum possible grade is 10. Other attributes of training are guided projects done by the student, papers published, and so on. Finally, a third metric could be faculty opinion (other than CPI) of the student's suitability and performance. However, in IITB and most other institutions, faculty opinion is neither sought nor supplied. The CPI remains the most widespread and standard measure of training and one which accounts for a large fraction of the students efforts, in terms of the

15   It is to be noted that this is just an ordering. Second rank does not imply that candidates in rank two are only half as meritorious as the top-ranked students

Table 8: Significance of CPI and checking inequality in salaries (i.e., Gini coefficients)

PROFILE#	SECTOR	SLOPE (VS. CPI)	T-VALUE	GINI	N
Super-GG	Finance	0.24	0.82	0.209	10
Super-GG	IT	0.23*	4.36	0.116	42
II	Education	-0.03	-0.57	0.169	18
II	Finance	0.12	1.17	0.086	13
II	FMCG	0.239*	5.68	0.198	19
II	IT	0.038	0.62		22
GI	Consulting	-0.006	-1.2	0.213	10
GI	FMCG	-0.10	-0.97		20
GI	Finance	0.037	0.83		10
GG	Consulting	-0.17*	-2.51	0.239	117
GG	Finance	0.37*	9.61	0.311	92
GG	IT	0.345*	5.19	0.18	144
IG	IT	0.091	1.25		28
IG	Consulting	0.16*	2.01		11
IG	Finance	0.038	0.91		19
Super-GG	ET	0.006	0.06	0.23	25
GG	ET	-0.054	-1.19	0.109	140
GI	ET	0.087	0.9	0.165	25
IG	ET	0.09*	2.35	0.119	54
II	ET	0.005	0.12	0.108	64

time spent. CPI usually influences placements in three ways, viz., (i) a nominal measure used in cut-offs for short-listing, i.e., for forbidding students below a certain CPI to apply for a job profile, (ii) a positive measure in ranking successful candidates, and finally (iii) which reflects an actual preparedness and correlates with the performance of the student in interviews, especially on questions related to her domain. We use the CPI as the key attribute of training.

We next check if training, as measured by CPI, has a significant role in placements as measured by annual salary (ASAL). This is done by estimating a simple regression of the following form for each profile-sector pair, j.

$$ASAL_{ij} = \alpha_j + \beta_j CPI_{ij} + \varepsilon$$

Where, ε is the usual noise with mean zero and variance σ^2.

We now come to Table 8. The first few rows list all profile-sector pairs for which either (i) the linear regression of CPI vs. salary

has a statistically significant slope, or (ii) where the Gini coefficient[16] of the salaries is above 0.15. The last five rows of Table 8 list the data for the ET sectors, whether or not they satisfy the above two criteria. Two key observations which connect relevance of training with the sectors of employment are:

Relevance in non-core sectors: We see that global finance, global IT and Indian consulting, are the sectors most sensitive to CPI. On the other hand, global companies serving Indian market for the same operations – finance, FMCG, consulting – are insensitive to CPI. Given that the disciplinary training is not relevant to these job profiles, the CPI is most likely used confirm the initial selectivity of the student. An interesting outcome is the negative influence of CPI on salary in the GG consulting sector[17].

Poor relevance in core sectors: Surprisingly, barring one, all ET sectors are indifferent to

CPI, and more so, firms which serve Indian markets, i.e., ET(GI) and ET(II). A notable exception is ET(IG), i.e., Indian engineering for global clients (albeit a small sector) which largely hires M.Tech graduates (72%) of non-EE and non-CSE streams[18].

Thus, we see a disconnect between the training offered and salaries in the relevant sectors. On the other hand, there are a fair number of large Gini coefficients, which indicate significant variation in the salaries of graduates within the sector (column 5). Taken together this suggests that there are other attributes of merit which are at work and which may be distinct from CPI. These may come from other campus activities of students such as organization and participation in events, holding positions of responsibility and also individual distinction. Interestingly, it is the finance sector, especially for the global clients (GG(F)), where there is maximum variation in salaries. The sector not only values CPI but also some other attributes of merit, as indicated by high Gini.

Given the general insignificance of technical training, other than at the tail end of the selectivity spectrum, we are justified in using

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16   The Gini coefficient is a traditional measure of inequality (such as income or access to a resource etc.) or spread in a set of non-negative values. A Gini of 0 indicates equality of all values while an index of 1 indicates complete inequality. A value closer to one indicates more inequality in salaries offered.

17   We don't have any explanation for this. A more disaggregated analysis at firm level is needed that would look into which kinds of GG firms devalue CPI.

18   Over 83% of their hiring is from Mechanical, Metallurgy and Chemical engineering streams.

Table 9: Sectors and salaries

PROGRAMS	M(O)	M(EE)	M(CSE)	B(O)	D(O)	B(ME)	D(EE)	B(EE)	B(CSE)
SuperGG	6 (25.4)	7 (28.9)	9 (55.3)	8 (20.9)	8 (29.2)	3 (38.3)	7 (41)	5 (44.6)	31 (54.7)
Finance(GG)	3 (6)	2 (11.5)	7 (10.3)	22 (6.6)	16 (9.3)	5 (10.5)	9 (13.8)	11 (20.2)	7 (21.6)
Consult.(GG)	18 (4.4)	2 (4.4)	4 (11.3)	32 (10.0)	30 (10.7)	10 (11.5)	11 (12.2)	2 (10.5)	1 (10)
IT(GG)	2 (15.3)	15 (10.5)	48 (10.9)	9 (6.0)	10 (6.9)	2 (6.9)	3 (10.2)	4 (9)	9 (11.2)
ET(GG)	21 (6.4)	49 (8.2)	12 (9.1)	2 (8.3)	15 (8.1)	4 (8.5)	5 (7.9)	6 (7.3)	2 (7.8)
ET(IG)	34 (6.8)	5 (5.3)	0 (-)	4 (5.1)	6 (6.7)	2 (6.5)	0 (-)	1 (6.8)	0 (-)
ET(II)	14 (6.0)	5 (7.1)	0 (-)	13 (6.0)	10 (6.7)	18 (6.7)	0 (-)	4 (8)	0 (-)

Note: Figure in parenthesis give the average salary for the group; shaded regions means these categories have been considered for drawing the selectivity curves.

selectivity itself as a surrogate for the productivity label θ(x) for graduate x.

Sector-specific Selectivity

We now proceed to compute the sector curves C(S) for the major sectors above. For each of the seven sectors, we compute the number of students recruited from each selectivity group as shown in Table 9. Next, to plot the wage curves, we retain the largest three to five numbers (depending on the actual magnitude) for each sector. This truncation yields a sub-sample of 503 (60%) students of the total sample of 833. The ordering of the columns is an interleaving of the M.Tech. and the UG programs in roughly the order in which employers value these programs as measured by their average salary. Expectedly, separately within the UGs and the PGs, these roughly match the order of closing ranks at the JEE. Some PG programs, viz., M.Tech. (CSE) and M.Tech.(EE) have moved right after the UG programs in the same discipline thereby equating the selectivity of M.Tech. (EE) with B.Tech.(Mech.).

This leads us to the sector curves as shown in Figure 3. The curve for Super-GG has been dropped since (i) the average salary is more

than twice the standard deviation of the next group, and (ii) the locations are in various places outside India, having different purchasing power, making it difficult to compare salaries. Figure 3 is rather revealing and the crossings indicate many key features of the placements at IITB.

1. ET(II), i.e., Indian engineering for Indian needs, pays upto about Rs. 6.7 lakhs per annum (p.a.). The selectivity for this is at B.Tech.(Mech.) or lower. Students paid salaries beyond that largely serve global companies with global markets.
2. Global engineering saturates at Rs. 9.1 lakhs p.a.; Global IT and Consulting saturate at a much higher level. Global finance does not saturate.
3. The lowest selectivity bracket (i.e., M.Tech in non-EE/CSE disciplines) stands out for placing most of its graduates in ET and very few in non-technical sectors such as Finance and Consulting.
4. ET (IG), i.e., Indian engineering companies serving global markets, stands out for being the most "technical" of all sectors. It pays more for CPI and for number of years of training. It largely employs M.Tech.(O).
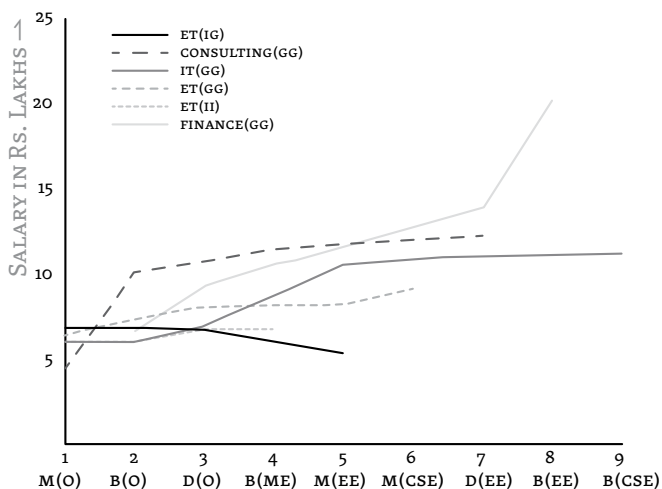5. Training at IITB (as measured by CPI) is

Figure 3: Branch/Sector specific Selectivity Curves

largely irrelevant for ET companies serving Indian markets. It is moderately relevant to companies serving global markets.

6. The misallocation is not restricted to UGs. The allocation of the PGs, though more technical, is largely to global companies serving global markets. The M.Techs in CSE largely work for IT(GG), and those from EE work for ET(GG) companies respectively.

Other M.Techs contribute to ET(IG) and, to a small extent, ET(II). Thus, the biggest beneficiaries of the M.Tech. programs are global IT and global engineering services.

7. For most UGs, non-technical sectors dominate salaries and placements, and also employ a substantial number of graduates. At selectivity below B.Tech.(Mech.), it is Global Consulting which dominates the job market, while beyond that it is Global Finance.

8. For most UG students, the training received in their programs, as measured by their CPIs, is either irrelevant to their sector of employment, or if relevant, it is largely inconsequential. Selectivity at the time of entering the institute has a substantial influence on sectors and on salaries.

The above analysis reveals excessive selectivity or merit at the high school levels, i.e., exceptional performance in a multiple-choice examination on a high school syllabus, to be an important factor in determining salaries of fresh engineering graduates. It contributes significantly to the misallocation of students away from ET sectors and away from direct participation in the Indian economy and to a set of highly branded and well-paying service-sector jobs. The analysis also shows that for UGs, the selectivity even manages to trump the technical training that IITB imparts. This training and the current curricula at IITB is perhaps valued by global engineering companies but is unable to command any premium

in engineering placements for Indian markets, leading us to question their relevance to Indian needs and engineering practices.

This provides an answer to both the misallocation and the relevance problems posed in the previous section. However, it also leads us to the JEE and GATE exams, which form the basis for selection of students into the IITs. These exams, especially the JEE, have substantial influence on school curricula and also the pedagogy of science in the country (see for example, Sec. 6.5 of NCERT, 2006). The spectre of irrelevance leads us to GATE, the certifying examination for all engineering graduates in the country, and one which is administered by the

IITs and is largely based on curricula deemed as "core" by the IITs. In fact, both these exams touch upon the very conduct of higher education in the country, a sector identified as crucial for our economic development

Our next objective is to offer a connection of identifying merit in a globalized world with some of the deeper problems in the Indian economy, especially the conduct of training and research in science and technology, stagnant and poor quality manufacturing, few entrepreneurs per capita (Ghani et al., 2011) and poor development outcomes. Globalization has been implicated by many authors as an important factor in poor development outcomes and rising inequality. See for example, Kremer and Maskin (2003), Kremer (2006) and the references therein. In fact, Kremer and Maskin offer an explanation for this which seems applicable here. They provide a mechanics of job formation and merit and its connection with societal inequality. It is noteworthy that they mention India explicitly as having a possible "dualism" in its economy.

3. Globalization, inequality and excess merit

In this section, we connect the identification of merit and subsequent allocation to broader macro-economic variables. We show

that in a stylized globalized world, an identification of excess merit within the less developed society poses certain allocation risks. This in turn, may lead to higher initial wages, but eventually to lower wages, higher inequality and a loss of entrepreneurial skills within the less developed society.

We adapt and extend some of the arguments of Kremer and Maskin (2003). As before, a society consists of individuals x, each with a productivity or skill level θ(x). All firms in this society have only two employees, viz., the manager and the assistant with the assumption that the manager manages, i.e., interfaces between society, market and the production process, while the assistant handles routine production. The production of this firm is as follows: if the skills of the manager and the assistant are 'a' and 'b' respectively, then the output of the company (a, b) is the stylized production function f given by f (a, b) = a2b. This is a variation of the popular Cobb-Douglas production function and is used routinely in the literature, see for example, Kremer (2006), Kremer and Maskin (2003). The basic assumption is that workers of different skill levels are imperfect substitutes and different tasks within the production process are complements (Kremer and Maskin, 2003). It is easy to infer that if a > b then the company (a, b) has higher productivity than the company (b, a). In other words, for a larger output, the manager should be the person with the higher productivity.

Let us consider a society S with only two types of people, viz., consisting of a_i's and b_j's with skill levels θ(a_i) = a, and θ(b_j) = b with a > b. In such a situation, three types of firms are possible, viz., (a_i , a_j), (a_i , b_j) and (b_i , b_j). Let us consider the question of the nature of firms in this society which maximize social output.

As in a lemma of Kremer and Maskin (2003), for ì = (1+√5)/2 , if a < ì.b, then the output of the society S is maximized by

cross-matching skills i.e., maximizing the firms of the type (a_i, b_j). On the other hand, if a>ì.b, then the output is maximized by minimizing the number of firms of the type (a_i, b_j) i.e., having more firms of the same type (a_i, a_j) and (b_i, b_j).

The proof is easy and we illustrate using an example below. The lemma explains why a society with members with sufficiently unequal skill-levels and productivities are likely to create a "duality" in industrial structure with un-mixed firms, wherein these members have independent economic trajectories.

Consider a society with 4 persons of skill levels {2,2,3,3} i.e., with a 50% skill gap between the two worker types. For the mixed company set (3,2), (3,2), the net output is 2 x 32.2 = 36. The pure firm set (3,3), (2,2) generates net output of 35 (i.e., 27+8). On the other hand, for S2, with skill levels {4,4,2,2}, the mixed-company set gives an output of 64, while the pure set yields 72. Thus, S2 will have two disjoint societies So = {4,4} and S00 = {2,2} with independent economics.

For a firm (a,b) with output a2b, let the wages be divided in the ratio 2a:b i.e., in the ratio of their marginal productivities. We now consider the case of two societies S1 and S2 – one predominantly developed and other developing - and study their interactions.

Let S1 have 4 people of identical skill levels A and S2 have 6 people with skills of a,a,a,b,b,b with A > a ≥ b and also a < ì.b, i.e., a and b are sufficiently close. In the un-globalized case, when S1 and S2 do not interact with each other, social output and wages would be as per Table 10. We assume

Table 10: Unglobalized world

SOCIETY	S1 {A, A, A, A}	S2 {A, A, A, B, B, B}
Company set	(A, A), (A, A)	(a, b), (a, b), (a, b)
Total output	$2A^3$	$3a^2b$
Total Wages	$2A^3$	$3a^2b$

SOCIETY	S1 = {4, 4, 4, 4}	S2 = {2, 2, 2, 2, 2, 2}
Company set	(4, 4), (4, 4)	(2, 2), (2, 2), (2, 2)
Total output	128	24
Total Wages	128	24
Nominal wages	{42.7, 42.7, 21.3, 21.3}	{5.3, 5.3, 5.3, 2.7, 2.7, 2.7}
# managers, # assistants	2,2	3,3

that (i) societies arrange firms so that output is maximized, and (ii) the firms operate in a competitive environment and that their net produce is distributed as wages in the ratio above. Thus, since there is no interaction between the societies, for each society, the total wages equal the total output of the companies. As an example, consider the case with $A = 4$ and $a = b = 2$, Table 11 computes the wages of the managers and their assistants with some additional details.

For the globalized case, we allow firms to have employees of either society so that, in the steady state, the overall output of both societies together is maximized. For the purpose of accounting, we assume that (i) the owner of the firm is the manager; and (ii) the output of the firm is consumed by the society of the manager and is accounted as such. Similarly, the wages of a worker accrues to the total wages earned by the society of the worker. Finally, we compute effective wages by scaling the wages to match the net output of the society. This captures the fact that the wages follow the total output of the economy.

1. As the globalized regime allows for joint firms, i.e., firms with members of both societies, for case when $A > ì.a$, globalization does not result in any interaction between S1 and S2 (Table 11)[19].Now

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suppose that society S2 conducts a test and identifies two members of S2 to be of relatively higher skill (i.e., skill of 3 instead of 2), and let us call this new society as $S2^0$ (Table 12). We see that this will immediately lead to an interaction between the two societies as illustrated in Table 13. We also consider the case, when higher skill level in S2 is identified to be 2.5 and not 3 (and we call this as case $S2^{00}$). Interestingly, for a lower skill identification, i.e., of 2.5, with $4 > ì.2.5$, the globalized and un-globalized outcomes remain the same and are captured in Table 14. We compare the relative outcomes for each society, and in each situation, as follows:

2. Comparing $(S1, S2^{00})$ with $(S1, S2^0)$, we see that nominal wages for S20 are higher than in $S2^{00}$. The net output of $S2^{00}$ is more than in $S2^0$ and the effective wages for everyone in $S2^{00}$ are higher than in $S2^0$. Thus, this creates the paradoxical situation where identification of increased skill levels from $S2^0$ to $S2^0$ actually reduced effective wages for all.

3. Comparing the situation $(S1, S2^0)$ and $(S1, S2^{00})$, it is clear that most members of S1 will prefer $S2^0$ as a partner society than $S2^{00}$. In other words, if members of $S2^{00}$ can indeed be identified as being of skill level 3 instead of 2.5, then it is S1's interest to aid this identification and labeling. On the other hand, it is in S2's interest to suppress this labelling. Thus an identification of merit greater than 2.5 is detrimental to the interests of S2, and to members of S2.

4. In any economy, the impact of increase or decrease in nominal wages is immediately felt by the workers, while the change in real/effective wages takes some time to register. Thus, for a member of S2 of skill level 3 but an identified skill level of only 2.5, there is an immediate incentive to

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19 In such situations, even if foreign firms do relocate to developing countries, they form enclaves with hardly any interaction with indigenous firms (Kathuria, 2002).

Table 12: Unglobalized world (with selectivity) for $S2^0$

SOCIETY	S1 = {4, 4, 4, 4}	$S2^0$ = {3, 3, 2, 2, 2, 2}
Company set	(4, 4), (4, 4)	(3, 2), (3, 2), (2, 2)
Total output	128	44
Total Wages	128	44
Nominal wages	{42.7, 42.7, 21.3, 21.3}	{10.3, 10.3, 7.7, 7.7, 5.3, 2.7}
# managers, # assistants	2,2	3,3

Table 13: Globalized world (with selectivity) for $S2^0$

SOCIETY	S1 = {4, 4, 4, 4}	$S2^0$ = {3, 3, 2, 2, 2, 2}
Company set	(4, 4), (4, 3), (4, 3)	(2, 2), (2, 2)
Total output	160	16
Total Wages	121.6	54.4
Nominal wages	{42.7, 28.8, 28.8, 21.3}	{19.2, 19.2, 5.3, 5.3, 2.7, 2.7}
Effective wages	{56, 37.8, 37.8, 28}	{5.6, 5.6, 1.6, 1.6, 0.8, 0.8}
# managers, # assistants	3,1	2,4

Table 14: Globalized world (with lower threshold of selectivity) for $S2^{00}$

SOCIETY	S1 = {4, 4, 4, 4}	$S2^{00}$ = {2.5, 2.5, 2, 2, 2, 2}
Company set	(4, 4)(4, 4))	(2.5, 2), (2.5, 2), (2, 2)
Total output	128	33
Nominal wages	{42.7, 42.7, 21.3, 21.3}	{7.7, 7.7, 5.3, 4.8, 4.8, 2.7}
Effective wages	{42.7, 42.7, 21.3, 21.3}	{7.7, 7.7, 5.3, 4.8, 4.8, 2.7}
Total Wages	128	33
# managers, # assistants	2,2	3,3

identify herself with the higher skill level of 3 and earn wages of Rs. 19.2. However, her eventual real wages decline from Rs. 7.7 to Rs. 5.6 if she and her cohort does indeed identify itself or not able to get recruited by S1.

5. Compared to $S2^0$, there are few managers in $S2^{00}$. As assumed earlier, being a manager entails more innovation and enterprise than being an assistant, whence the identification of members of $S2^°$ of skill level 3 actually converts them from managers to an easier role of assistants and yet increases their nominal wages.

6. In this particular example, and as measured by the Gini coefficient, globalization has led to an increase in inequality in S2 and a decrease in inequality in S1. It has also led to a concentration of managers in S1 and assistants in S2.

4. Selection and Meritocracy

The previous section highlights a mechanism of how skill differentials may be exploited by different agents and societies. It also shows that many important attributes of a society, such as inequality, the number of managers and entrepreneurs, aspirations of highly skilled workers, skill assets of a company etc., are intimately tied to strategic decisions of training and identification of skills within a society. As Kremer and Maskin (2003), Brezis and Courzet (2004), among others have argued, these mechanisms may play out on a national scale and directly impact macroeconomic variables.

Thus, we see that identifying and nurturing merit, especially at state's expense, is potentially risky in a globalized world and must be done with due diligence. This diligence must include an analysis of the allocation of the 'excellent' to various positions

within a society's economy or outside it. A society must also be careful about defining merit, especially if it means adopting metrics of productivity and skills of a different society and also of training its members to succeed on these metrics. Without this due diligence, the selection process will result in a transfer of key productive assets from the less developed society to the more developed one[20].

Following Stiglitz's (1975), let us define a meritocracy as a democratic society characterized by four attributes. These are (a) a notion of merit and a labelling and sorting function, (b) productive processes which utilize this sorting to increase net social output. As we have seen, a correct labelling tends to increase wages for the more productive at the cost of the less productive. Thus a state-funded labelling process will succeed only if (a) and (b) are coupled with (c) mechanisms to distribute this surplus so that a majority of the people benefit, and finally (d) an informed majority which votes for such a labelling having understood the process, its economic ramifications and the social outcome. We will call a society possessing properties (a)-(d) as a meritocracy.

The IITB placement situation is but one witness to how higher education in India fails to be a meritocracy. We begin with a conflicted notion of merit, we identify and train agents for whom we have no useful productive processes, and finally, there is no distributive mechanism which will benefit a majority of us, unless we believe in the trickle-down from the global economy. Thus, this violates properties (a)-(c) of our meritocracy, whence,

assuming a rational majority, it is a surprise that (d) holds at all. That it holds is largely because of the perception that the admission process is fair and locates talent. While superficially true, it masks the fact that high odds such as 1:200, makes any admission process highly coachable. That the labelling is fair and meritorious and offers inordinate rewards for the few and an escape to a better society creates an aspirational dysfunction (see Sohoni 2012) and deflects attention from the fact that the labelling is actually socially negative.

There are of course, many other witnesses, in both the physical as well as the social sciences, and at all levels of education. Most of these are rooted in a peculiar rationale for education which is upward compatible, i.e., enabling the excellent to migrate to a better society, at the cost of being downward accountable, i.e., enabling a majority to do better in situ. This is illustrated, for example, by the rationale for the class XII Physics curriculum of NCERT-2012[21],which we reproduce below.

"The higher secondary stage is crucial and challenging stage of school education as it is a transition from general science to discipline-based curriculum..... There is a need to provide the learners with sufficient conceptual background of Physics which would eventually make them competent to meet the challenges of academic and professional courses after the higher secondary stage. The present effort of reforming and updating the Physics curriculum is an exercise based on the feedback received from the school system about existing syllabus......... The recommendations of National Curriculum Framework-2005 have been followed, keeping the disciplinary approach with rigour and depth, appropriate to the comprehension level of learners. Due care has

20   A clear manifestation of this is increased inequality within the society and across rural-urban areas in countries that have liberalized and given access to foreign firms. See Kathuria et al. (2013) for increase in manufacturing duality after liberalisation in Indian case, having implication for inequality. te Velde, 2003 for Latin America and Topalova (2010) for India also find increase in relative poverty with trade. Pavcnik (2011) gives a concise review of the impact of globalization on income inequality for several countries and concludes the same.

21   http://www.ncert.nic.in/rightside/links/pdf/syllabus/syllabus/desm_s_physics.pdf accessed on August 2013.

been taken that the syllabus is not heavy and at the same time, it is comparable to the international standards. Also, it is essential to develop linkages with other disciplines for better learning of Physics concepts and establishing relationship with daily-life situations and life-skills."

Thus we see upward compatibility of not inconveniencing the few excellent students who go on to professional courses after class XII, meeting international standards and other internal requirements as higher priorities than the downward accountability of enabling students to interpret daily-life situations. Such a peculiar focus on identifying the excellent and catering to their trajectories is a hallmark of the elitization of our higher education by elite institutions and one which is recommended to the not-so-elite ones as well. It is also responsible for much of the misallocation and irrelevance in the outcomes of higher education.

5. Where do we go from here?

The conduct of higher education is too broad a subject for us to handle here and we will limit our-selves to the IITs and perhaps to the broader ambit of engineering education.

The first question, of course, is to establish if 2013 was a special year and if IITB is a special case. To answer the first sub-question, we must point to the analysis done by Sukhatme and

Mahadevan (1988), of "brain drain" in the 1970s. In that era too misallocation was rampant and it was implemented by graduates moving abroad for higher studies. That said, not much systematic data is available in the public domain and there are no standard formats. Even the format for IITB has changed twice over the last 5 years. However, based on what is available and through private conversation with the IITB placement coordinator, (i) the data for 2012 and 2011 reflect a similar

allocation, and (ii) the old IITs, to a greater or lesser extent, have a similar allocation profile (Anant, 2011) and hence the consequent issues of misallocation and poor relevance. In the next rung, i.e., the NITs, a similar allocation is seen, albeit to the IG companies working in IT and ET sectors. See for example, the placements of NIT (Bhopal)[22], where the "software" sector is the biggest employer by far. There are some exceptions, e.g., NIT (Durgapur)[23], which placed roughly 100 UG graduates (out of 607) into the steel and mining industry. On the whole, it would be useful for MHRD to evolve frameworks for reporting placements from the IITs and the NITs and other colleges. This would help in the analysis of selectivity and training, institutional profile, etc., and its relationship with wages for engineering companies for Indian markets and for global service companies.

Secondly, and more broadly, it is for MHRD to focus on five sets of questions below. The timing for this is crucial since (i) it is in the process of rolling out Phase II and the design of Phase III of the TEQIP program of investments in engineering colleges, and (ii) the IITs are headed for a review in 2014.

Question 1: What is the role of elite institutions? What is their influence on the conduct of R&D for the benefit of society? Are these the role models for other institutions? Are they the right custodians of curricula for a developing country?

Question 2: What are the key developmental demands, explicit or implicit, that Indian society poses for engineers? What are the key strategic sectors? What is the training and research that is required of engineers to work for these needs? Are the IITs and other engineering colleges preparing students to face

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22   Source: http://www.manit.ac.in/manitbhopal/ index.php?option=comcontent&view=article&id=639 accessed on 10th October, 2013.

23   Source: http://www.nitdgp.ac.in/placement_activity. php accessed on 10th October, 2013.

these demands?

Question 3: Is engineering placement working to the satisfaction of these demands? Are there better mechanisms to match supply with demand? Is the company-employee model the only one or are there other models, such as the apprentice, entrepreneur, consultant or the development professional? Is there a need for closer collaboration between MHRD and key state development agencies?

Question 4: What is the correct input mechanism for India's engineering colleges? What is the impact of the current methods of input on the conduct of training and research within our colleges? What are the externalities of the method of selection, especially on the school curricula?

Question 5: What is the impact of globalization on society and on engineering education? What would be the impact of accreditation of our engineering education to an international definition of engineering? What is the locus standi of our strategic and developmental needs in this universalization of engineering?

Some answers to the above questions are partly offered in Sohoni (2012), (2013). The broader strategy should evolve from a multi-stakeholder and inter-ministry consultation. The first step is to spell out a theory of knowledge and practice for India as a developing country. Practice is an important element of engineering for a society in which basic engineering services of sadak, bijli, paani (i.e., roads, electricity, water) are still unmet. The second step is to develop the regional engineering college as a knowledge resource and as an incubator of civil society. The training within such a college should be inter-disciplinary and instrumental and enable the engineer to work directly with society. Foremost, the elite university must bring rigour and legitimacy to this important agenda. It must help society to discover new ways of delivering value and of new professions and innovations within a strategic and developmental context. ✳

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IIT Bombay Placements
An Alternative View

ALI CONTRACTOR

Sohoni and Kathuria have analyzed IITB's placement data for 2013 quite thoroughly and the immediate conclusions are obvious and confirm what many of us have been lamenting about for the past several years. Their article also raises a number of questions that we need to debate. The first and probably the most contentious is whether JEE is a measure of merit or rather does it measure the merit that is relevant to the making of an engineer/technologist that a developing society like ours needs. The second is whether the placement data for IITB is unique to the IITs or is the same trend observed in other elite institutions across the world. And finally, is it possible for an academic institution to influence the placement choices of its graduates.

Any talk of reviewing JEE or questioning its efficacy arouses strong passions, particularly among IIT alumni. It is only natural that we are touchy about any doubts being cast on what is for all of us the very (and often, only) mark that distinguishes us from the rest. However, once we get over the initial wave of rage, it seems reasonable that JEE should change with the times as the circumstances and requirements change. Perhaps the two most closely watched numbers, by aspiring youngsters and their over-bearing parents, are the JEE ranks and the placements salaries. Everything that goes on in between seems of little consequence. It is necessary to question the claim of meritocracy in the JEE. How import-

> **So what has happened? Has merit migrated out of the metros? Certainly, awareness and aspirations have surged but does economics not play a role?**
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ant a role does coaching or preparation play in success at JEE? If one fails to qualify in two attempts but ranks among the top single digits at the third attempt, what does it say about JEE's ability to measure 'merit'? In the early years, IIT entrants mainly came from the four metros. Perhaps the awareness was greater in the metros because IITs were not yet the brand name they are now. But it is also true that the metros had coaching classes for JEE, the best known being Agarwal Classes in Mumbai. However, it is also true that many entrants did not take any special coaching. Now the demographic composition entering IITs is very different, the four metros do not dominate the merit list, most entrants come from smaller towns like Kota, Jaipur and Patna. These are also the towns that are teeming with coaching classes, Kota being the front-runner. So what has happened? Has merit migrated out of the metros? Certainly, awareness and aspirations have surged but does economics not play a role? Why is there little representation from other parts of the country, particularly the

North-East?

Is the placement data for IITB unique or is it similar to the trend at other elite institutions across the world? While I do not have empirical data, anecdotal evidence from talking to Deans of universities in US, it appears that they too are faced with a similar situation. The choices of job-seekers are driven by salaries and the perceived glamour of certain professions as opposed to others. In a global market for talent, it is but to be expected

> In a global market for talent, it is but to be expected that IITB graduates have the same or similar options as those graduating from other elite institutions and, not surprisingly, they make similar choices.

that IITB graduates have the same or similar options as those graduating from other elite institutions and, not surprisingly, they make similar choices. In this context, it is relevant to recall an early study on so-called 'brain-drain' by Profs. Sukhatme and Parikh. It emerged that it was not as severe as made out by critics and besides, this phenomenon was driven more by the state of the US economy than any thing one could do in India. Then, IIT graduates went abroad, for the most part, to get a Masters and better their economic prospects. Now, our students' preference is for jobs that pay better and also provide an international exposure. It so happens that these are mostly in Consulting, Finance and IT.

The most important point is, can we, as an educational institute, do anything about it? Teachers can be change agents but it is also true that educational institutions are bastions of tradition and continuity. Change may be slow but it is certainly possible. Examples that come to mind are CTARA, SINE and more recently, the Desai Sethi Centre for Entrepreneurship (DSCE). CTARA provides a platform for our students to get involved in nation building in a very direct manner through focused projects and the MTech program in Technology & Development. DSCE will equip potential entrepreneurs with skills that will help enhance the success rate of startups and encourage more of our students become job-creators rather than job-seekers. I am quite optimistic that IITB will fulfill its destiny, but self-critical analysis such as provided by Sohoni & Kathuria is also essential. ✳

Prof. Aliasgar Qutub Contractor

Prof. Aliasgar Qutub Contractor, former HoD of Chemistry Department, former editor of Technik and former Dean Alumni and Corporate Relations, is an alumnus from C'73. Endowed with a rare gift of narrating serious and heavy matters with a tongue held firmly in cheek, his incisive and informed views on IIT Bombay and alumni relations are also in evidence in his column Sim Sim khul ja.

A Student Perspective on Placements at IIT Bombay

INSIGHT TEAM

"IITB student cracks a 2.1cr package" is all that placements at the prestigious Indian Institutes of Technology mean to the outside world. However, most media bodies barely scratch the surface when it comes to explaining what really goes on during the placement season. Leaving aside the 2.1-crore debate, upon which a lot has already been written online, we would like to delve deep into the journey that a student goes through while making himself/herself job-ready.

The placement process, from a student's perspective, can be broken down into following phases:

1. The Dilemma
2. The Chase
3. The Expectations
4. The D-Day

IIT Bombay gives one an exposure to various fields, but when it comes to final placements, students generally find themselves clueless about the career choices they would like to make. The variety of job profiles that are available during placements is generally unseen during internships, which is the only professional exposure students have prior to placements.

The condition is only worsened by the low number of technical profiles available as job options, and the even lower number of students who rank these profiles high up on their priority list. In case a diverse variety of technical profiles was available, students could

> **You just can't stop, take a moment out, and reassess your situation because everybody around you is running as fast as they possibly can – and you need to catch up.**

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at least have made their choices based on the years they've spent on the related coursework. Then the only source remaining for making choices are the Pre-Placement Talks (PPT) offered by companies, second-hand information made available via seniors and, of course, the internet. This is perhaps a large reason why a majority of people have little or no idea about what they like and what they want to pursue, but only a vague idea about what they definitely don't want to do.

Instead of informed decisions, arbitrary choices are made.

Being undecided, in turn, increases the burden of preparation. People chase all opportunities with arms wide open. The daily routine includes CAT preparation, attending PPTs, writing SoPs, preparing for HR questions, solving puzzles, practising GD's and case studies. This often translates to skipping classes and leaving assignments untouched right upto the last possible moment. You just can't stop, take a moment out, and reassess

your situation because everybody around you is running as fast as they possibly can – and you need to catch up. At that moment, you care less about the direction where you are headed, and more about the pace at which you are running. If you are not giving enough emphasis to solving CAT problems just because you want to pursue engineering, then people around you constantly ask you why you've given up so soon!

There is a perceived notion that the earlier

> **A lot of things that students do or plan to do since their first year are targeted toward getting a good job, rather than pursuing hobbies for their own sakes.**

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one gets placed, the more stud (s)he is. The day-wise slotting is done keeping compensation packages in mind, and hence a student genuinely interested in taking up a core position is automatically labelled less stud than someone who opts for a yet another role in a bank. Understandably then, all hell breaks loose when Job Application Forms (JAF) signing starts and the uncertainty of securing a job starts looming.

The sudden gush of JAFs immediately after the resume submission deadline makes students give little thought before signing up for any given JAF. This perspective starts changing once the shortlists start rolling out. When certain selective firms shortlist just 30 or so students of the hundreds who apply, many who have been preparing for 3–4 months are left dejected. When the next set of shortlists (for other major companies) are released, a nearly identical set of students are chosen – irrespective of the role being offered.

During the placement season it wouldn't be an exaggeration to say that academics are almost entirely neglected because students are compulsorily required to attend to and complete a multitude of tasks by the Placement Cell apart from preparing for their placements as soon as the 7th / 9th semester kicks off. In fact, in recent years, placements have begun consuming students' minds since the start of their IIT life. A lot of things that students do or plan to do since their first year are targeted toward getting a good job, rather than pursuing hobbies for their own sakes.

In their pre-final semesters, students start by crafting their resumes and often devote more than two weeks to first make multiple drafts and then get them verified by seniors. If they don't devote this much time and attention, they stand to lose out in the first phase of the rat race itself – simply because their resume isn't polished enough. In the process of verification, they also enquire about the potential companies that they would be shortlisted into – thus inheriting a huge number of subjective biases. Of course, beyond all the pseudo-networking, placement talks and interaction sessions, students also have to prepare for their interviews by reading up relevant books and blogs.

Amidst serious placement preparation, arrive the inevitable endsems. Recently, a lot of students take up only core courses (and not the electives) that are a part of their curriculum. This, too, is done in order to make some extra time to prepare for placements. Others do the best they can to ensure adequate preparations for both endsems and placements.

Finally arrives December.

Every company is allotted a particular day and slot in which it is supposed to conduct its process. Fortunate are those who are shortlisted in companies of their choice, and are also able to clear the prerequisite interviews. Slightly less fortunate and confused are those who are shortlisted in companies spanning a range of sectors in the same slot. Most find it difficult to appear for multiple rounds of interviews with companies that have completely

different expectations in one slot. Slotting doesn't take into account the preferences of students either, instead using the compensation package being offered as a metric. This results in a lot of brilliant students securing a job as soon as possible instead of waiting for few days to sit for a core company – which has neither the packages, nor the clout of the financial bigwigs.

Placements have definitely been an enriching bittersweet experience for all students and given them a taste of the real world. The process has also caused students to revise their courses, learn the basics of finance and economics, and stay connected with the current affairs, all in pursuit of a good job. Clearly, the Placement Office has so far focussed on maximising the number of students placed on campus – a justifiable stance. Only students who've been through the placement season can answer how happy they are with their company, how their parents have perceived their compensation after all the media hype, and if they actually repent for their hurry to get placed as soon as possible. *

insight
the third eye

Insight Team

This article will be published in Insight's flagship edition during the month of December. Insight is the official student media body of IIT Bombay. www.insightiitb.org
This article is the joint team work of Prakhar Singh & Sashank Konete. Insight is currently the only active official media body in the institute run voluntarily by students

Polly Tickles Attire

GRUMBLEBEE

Yes! That's what the Queenbee ordained me to write about. Now what do I know about Polly? Why does she tickle attire? What if she does? What can I write about it? Wait! I think I get it. There's a phonetic correction to be applied here. Happens when you take instructions on phone. You need a phonetic correction. Maybe she meant Political Satire and not Polly tickles attire.

Ah well! For the past few months, I've been living in an existential crisis like Sartre's ire. I made my career at Fundamatics by reporting the bungling at Madam G's Pvt Ltd, MGPL in short. Through 5 pieces titled JEE Huzoor, Bungle in the Jungle, Cabinet Rebungle, Tearing up Nonsense and AAP, BAAP aur PAAP, I reported on the frequent bungling indulged in by Madam G's men including the blue-turbaned head-nodding remote-controlled CoE (Chief of Estate) and other assorted dramatis personae like Shudder Jowar, P Chillum Humdrum, Menace Tawry, Uphill Cymbal, Sheila-in-deep-shit et al. Bungling was so frequent, I virtually lived in 10, Warpath-Madam G's bungalow on the estate. But alas! As I had predicted, a hostile takeover of the estate was attempted by Marauder Moody and his saffron-chested khakhi-shorted men and finally, they won. They took over the estate lock, stock and oil barrel. Madam G and her son Rollback Aandhi crashed like Humpty Dumpty and all kinsmen could not put them together again. All the bunglers evaporated into oblivion like the hot air they were full of. My existence at Fundamatics was under threat. What or who would I grumble about now?

When Queenbee told me to write a satire, as I now understand, I went back to MGPL to see what I could report and I found myself walking into a tea party. Read on to learn more.

Grumblebee

Image Credit : Shreyas Navare, Hindustan Times

MGPL looked like a medieval ruin. Tattered and torn. There was an army of restorers trying to put things in place. The new estate gardener Prakash Jawbreaker was supervising the construction of a lotus pond. Specialist painters from Nagpur were colouring the walls with a liberal dash of saffron. New telephone operator Ravi Bunker Mossad was installing a hotline to Nagpur. New CFO Overrun Jetlag was desperately looking around to locate concealed treasure-chests and sighing at all the empty coffers that showed up. Marauder Moody, impeccably dressed as ever, drove in and all congregated at 7 Pace Curse Road for a meeting.

"Bhaion, aur bahut sari behenon", Moody began his address while pointing to the plethora of women in the room. I Smart Rani beamed a huge smile in acknowledgment.

"Congratulations to all for a successful takeover of the estate. We now need to mull over a new name. We cannot call it Madam G's Private Limited. It is neither Madam G's anymore. Nor is it private or even limited. Any suggestions for a new name?"

"How about "Ab ki baar estate"? That way, we can mock our enemies on Akbar Road." new Security Officer Raj Nut Singh suggested. "Or maybe "Achhe Din estate"." This was from waterwoman Amma Bore-thi.

"Bhaion aur behenon! This is not an estate anymore. We are now a mega conglomer-ate. In fact, Meaty Shah here will acquire 29 estates for us in good time. We need a name befitting a corporate entity that we will evolve into." Moody interjected.

"Sir! May I suggest "Moody Sarkar Unlimited"." This smart suggestion came from teacher I Smart Rani. "Name is appropriate and you said that we should not be limited to private or to limited."

Moody smiled. "Brilliant, you smart Rani. Moody Sarkar Unlimited. MSU. Reminds me of MS University in my constituency Vadodara. I'll go with this name." Assembled gathering broke into an applause and some showered lotuses on Moody in approval.

"But Sir!" Meaty Shah interjected. "You gave up Vadodara. Your constituency is Varanasi now. Not Vadodara."

"Hmm..." Moody continued. "You are right. I gave up Vadodara when people told me that it sounds like Vadra. You see, I used to sell tea at Vadnagar station. If I had lost this battle, I would have been selling tea at Vadranagar that would have come up in Hary-

ana. Speaking of tea, let's take a tea break. Who's providing us with tea?"

"Sir!" answered kitchen-in-charge Harsimrat Cower Bridal. "I have given the tea contract to Funny Shankar Ire."

"Why did you do that? Don't you know that Funny Shankar is a bartender at Akbar Road?" Moody shot back. "Not any more Sir! After your victory, Funny has shifted from bartending to tea making. There is nobody left at Akbar Road to drink, neither is any-

New CFO Overrun Jetlag was desperately looking around to locate concealed treasure-chests and sighing at all the empty coffers that showed up.

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thing left at Akbar Road to drink. Funny now swears that he will only serve tea rest of his life. In fact, he does nothing but drink tea."

"Why, does he not eat anything?" Moody quizzed. "No Sir! He's too busy eating his words." Moody laughed. "Ok, before we break for tea, I also want to tell you that I want to change my name."

Everyone was shocked into silence. "Why Sir? Marauder Moody is such a nice name." Meaty Shah tried to make Moody change his mind.

"Meaty! You don't understand. Days of marauding are over. From now on, I'll be Narrator Moody. You see, previous Chief of Estate i.e. CoE never spoke. He only nodded his head when Madam pressed the remote. I have to change that. From now on, only I'll speak and you all will nod. And I'll be CEO, not CoE." Everybody nodded in approval.

"One last thing before we break", CEO of MSU Narrator Moody continued. "We have to discuss one program every time we meet. So I propose that we start a cleaning campaign. All of you have been complaining that there is a lot of mess left behind by Madam G's

brigade. So let's all pick up our brooms and start cleaning."

"Sir! That would be a big mistake." Prakash Jawbreaker chipped in. "If we pick up brooms, people will mistake us for that mango-man Allwind Jhaduwal. Wanted to be a sweeper, but became the swept instead. We should not bungle like Madam G. Let's do something else."

"You make a good point Jawbreaker. Let's do this. Let's all use vacuum cleaners, not brooms. Electrician Fuse Goyal will provide us with power. That way, we won't look like that Jhaduwal character."

"But Sir! From where will we import vacuum cleaners? There is no money left to import vacuum cleaners. There's vacuum in the treasury." Commercial Officer Normal Sitharaman countered. "Aha! We will have to start making vacuum cleaners. And we have to make them here. Right here. MAKE IN INDIA." "Sir! Do you mean vacuum cleaners can be made in India?" Normal wondered.

"Do not say Made in India!" Moody thundered. "That reminds me of the Italian Maid in India. We have to take her to the cleaners in this moment of her political vacuum. Let us just MAKE IN INDIA." Everyone rose and moved to the dining room for a tea break, where Funny Shankar Ire requested Smart Rani to take a photo of him serving tea to Narrator Moody. Moody smiled, declined the tea, picked up a Thums Up bottle and started singing "Happy Days are here again......". ✳

Experiments with Pedagogy
Innovative Teaching Practices on Campus

INSIGHT TEAM

We see professors following a wide variety of teaching practices across the institute, with most of them willing to try out innovative new methods if they believe it would help their students. An influx of enthusiastic young professors has helped to accelerate this process. Here, we look at some of the most innovative and effective teaching methods employed across campus, and analyse each for its potential pros and cons.

Flipped Classroom

The classroom is typically envisioned as a place with a blackboard and chalks which the teacher uses to teach. However, there are teaching models which do not conform to this idea. One such model is the flipped classroom. The Flipped Classroom is a recently developed pedagogical model that completely redefines the concept of the traditional classroom. In this model, students are required to watch video lectures uploaded by the instructor before attending classes. The teacher has the discretion to employ various learning strategies in class such as tutorials where problems can be solved and concepts can be discussed. By employing such a method, students learn outside the class at their own pace and utilize the class timings to strengthen concepts. In IIT-B, a few professors have begun testing new waters by 'flipping' or 'partially flipping' their classrooms.

It was first attempted by Professor Kannan of the Chemical Department, and is currently being implemented by Professors Kameswari and Bhaskaran Raman of the CSE Department, among others. They observed that the flipped classroom method provided students an opportunity to learn at their own pace, thereby benefiting all categories of students. Professors also felt that the flipped classroom attempts to set all students on an equal footing. In a regular classroom setting, most professors are of the opinion that they ought to teach to the average student in class. They find it difficult to teach for 60 to 90 minutes and keep the whole class intellectually stimulated throughout. This often leaves the smart ones bored and the ones below average frustrated.

Flipped classrooms are remarkable in their ability to cater to the whole class. Video lectures may be paused or re-watched at one's convenience. If there is something that the student does not understand, they can instantly summon the entirety of the internet to their aid. It also promotes peer-to-peer discussion among hostelmates. It is a big bonus in large classrooms with an audience of 150+ students, wherein one-on-one interaction is nearly impossible. The flipped classroom technique is especially beneficial for students weak in English, who may take time to grasp concepts in class. Using video lectures, they may ask their friends to explain the videos or decelerate and replay videos for better understanding. In class, students are more inquisi-

tive and enthused to discuss and clarify doubts and solve problems. Much of the valuable class time is now used to deepen their understanding of concepts. The introduction of this model saw an increase in student-teacher interaction in class, with the students being active participants.

However, being an avant-garde model, most professors are skeptical of its success and prefer to stick to the conventional teaching practices. This method relies heavily on the

The Flipped Classroom is a recently developed pedagogical model that completely redefines the concept of the traditional classroom. In this model, students are required to watch video lectures uploaded by the instructor before attending classes.

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cooperation of the students to watch video lectures prior to class, failing which it becomes completely ineffective. Some professors believe that to counteract this, students can be motivated to watch video lectures and put in efforts by conducting weekly quizzes.

Also, the luxury of being able to access the lecture whenever one wants, undoubtedly makes some students take things easy. Most professors consider decreased facetime with the class a major downside. Arguably, the flipped classroom lacks the simplicity of the classic old-school classroom!

Innovative Assignments

Some professors, instead of adopting radical new teaching methods, simply choose to augment the existing orthodox method with some interesting ideas for assignments and exams.

For instance, dividing the class in random groups of 2 in the tutorials, where you pair up with a different classmate each week, as is done by Professor Ballal. The benefit of such discussions is that you get to learn different approaches and perspectives to a problem with which you might arrive at a solution. This teamwork is required in any field. It also promotes interpersonal skills, as you will have to work with a person you may or may not get along with at your workplace in the future. In addition to this, it ensures participation of the whole class.

Now this may sound too cool to be true, but Prof. U.K. Anandavardhanan sometimes releases the entire question paper on Moodle prior to the exam, with some portions blanked out. Thus, barring the actual problems, students know exactly which type of questions to prepare for, which builds their confidence and challenges them to prepare for tougher problems at the same time.

Another method involved students making group presentations which then decide their grades. Some professors, liked Professor Kashyap, expected students to make their own presentations instead of uploading the class slides, while some assigned diverse topics for the presentation. Thus, the students are compelled to read up research papers, science journals or theses for their presentations. Additionally, Professor Kashyap expects each student to submit a certain number of questions before each exam. He then prepares some portion of the question paper from this pool of questions. He believes this ensures that students cooperate and learn from each other.

Many professors also believe in creating assignments and exam problems based on real life applications. The student ends up solving a problem which he/she may have actually experienced, thus adding a practicality to their learning process. Professor Kedare of the Civil Department had an exam paper which had a
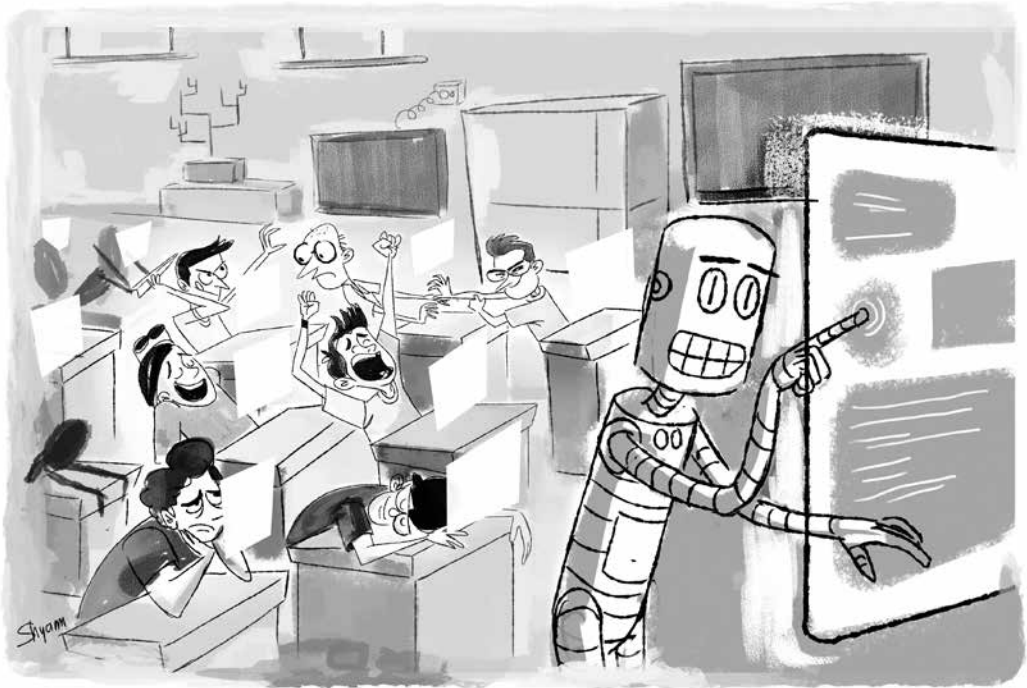
specific theme; railways. So all the questions were modelled around various mechanisms and processes involved in it.

Seeing how social networking is a major part of students' lives nowadays, professors such as Ganesh Ramakrishnan, R.B. Sunoj and AbhijeetMajumdar now use online forums like Piazza and Facebook to interact with their class. Many professors now maintain Facebook pages of their course, where general discussion and doubt-solving takes place.

Think, Pair, Share

Think, Pair, Share is a teaching method wherein a problem is first presented to students in class, after which they are given some time to think about possible solutions. They then discuss their solution with their neighbours, and finally present an answer to the whole class. On campus, this technique was pioneered by Prof. Sridhar Iyer from the CSE department.

Prof. Iyer, winner of the "Excellence in Teaching award" in 2013, believes in TPS as a teaching method because it aligns with his philosophy that the emphasis of a teacher should be on student learning, rather than on how much of the topic is covered. He believes that TPS improves his students' learning and in order to confirm his intuition, he partnered with research scholars and professors in the Educational Technology Department in the Spring of 2013, to measure students' learning and class participation. The sample on which the study was done was the freshmen batch of CS 101 during Spring 2013. What they found was that, contrary to the belief that undergraduates don't participate in class, on average 83% of the class was found to be doing the activities presented by Prof. Iyer, a number confirmed by students' own reporting in a survey.

Further, students' learning via TPS was found to be more than double of what it was without TPS. There are various benefits to this model. The students are continuously engaged in class which of course prevents them from falling asleep! Further, students learn from each other and get into the habit of discussing problems with their friends, simultaneously obtaining multiple solutions to the same problem.

A professor needs to practice it consistent-

> **Seeing how social networking is a major part of students' lives nowadays, professors such as Ganesh Ramakrishnan, R.B. Sunoj and Abhijeet Majumdar now use online forums like Piazza and Facebook to interact with their class.**

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ly to get students to believe in the method. They may feel that not much is happening in class as the lectures are fairly atypical. In the past, instructors too have felt that that too much time is spent on one activity, and that the net content covered in the class is insufficient. But according to Prof Iyer, these are only perceived cons as both issues can be taken care of with sufficient planning. So he recommends that instructors use TPS to explain a concept every alternate class, rather than relegating it to special occasions or tutorials. He also recommends TPS for the in-class component of flipped classroom to guide classroom discussion.

One of the professors who has started using TPS after Prof. Iyer is Prof. Ganesh Ramakrishnan, also from the CSE department. According to him, the professor should not be biased by a small fraction of the class that is tuned in, since a large part of the class often

remains left out. With TPS, he gets a chance to involve all the students and meet the needs of as many people as possible. He believes that students who go really fast may be a bit complacent about what they're learning; they may think that they fully understand the subject matter even when they don't. So, he likes to give students time to think on their own just to be sure that they've mastered what they're learning.

Prof. Ramakrishnan also partnered with the ET IDP (Educaton Technology Interdisciplinary Program) to perform formal studies in his classroom and their results were consistent with what was found in Prof. Iyer's class - that student engagement and learning increased significantly by implementing TPS. However, some students reported that the class was too slow. So there is a lesson to be learned regarding how long these activities should be planned for. Also, Professor Ganesh believes that it is important to explicitly mention the usage of the TPS technique in class for it to be more effective.

In conclusion it appears that TPS, when used in moderation, is great for involving students and improving their learning of subject matter.

Theatrics and Enthusiasm

The professor is an instrumental factor in the learning process of a student. Enthusiasm begets enthusiasm and it has generally been observed that students like professors who are active in the class themselves. Now you may say that there may not be a correlation between "liking a professor" and "extracting knowledge from him/her", but such professors definitely pique the curiosity of the student through deeply engaging lectures, short videos or challenging questions to ponder over at home. Intent on the part of the professor rubs positively on the students as well. The proof of this lies in the popularity and effectiveness of professors like R.B. Sunoj and PunitPar-

mananda.

Every class must be inclusive. The grasping ability of students varies widely within a class and it is important that the professor is able to let every student take something away from the course. A bright student may find going over the same topics again boring, so the professor must constantly fuel his interest by giving him/her challenging questions and concepts to think over. On the other hand, the professor must also cater to the needs of the student who is finding it difficult to cope up with the material. Striking this balance can be a lot more difficult than it sounds and the success of a professor in keeping the entire class engaged depends on it.

To quote Prof. R.B. Sunoj, teaching in a large class is like performing. If you don't perform well, you won't attract a crowd. To keep a class of 100 or more engaged; theatrics become a must. This may involve waking up sleeping students and inviting them to sit on the first bench (and occasionally by threats of eliciting dance performances from them) or connecting course concepts to relatable stories and memorable jokes.

This year we saw a tutorial for the Quantum Physics freshman course being conducted in Hindi, to facilitate the learning of students who are not very comfortable with English. This shows that the enthusiasm of TAs can also be a valuable contributor to students' learning.

Many professors believe that teaching is an art-form. Novel teaching methods are aids which help students think and learn differently. There is, however, no single teaching method which works well for all courses, professors and students. It is, thus, up to the professor to choose the method which their students benefit most from. This is also indicated by the fact that Professor Iyer (pioneer of TPS), Professor Sunoj (proponent of more orthodox teaching methods) and Professor Ballal (who encourages his students to solve practical problems)

have all won Excellence in teaching awards.

In the words of Professor Ganesh Ramakrishnan, the aim of experimenting with different teaching methods is not to find the single "best" method. At the end of the day, it is the pursuit of knowledge that is most important. As for the effectiveness of different teaching methods - to each, their own. ✳

insight
the third eye

Insight Team

On Being a Mountain that Invites Others to Climb

QUEENBEE

*T*here is something tired about buzz-words like 'leadership', 'thought leaders', 'leadership abilities' hanging on for dear life, even though they have become such overused clichés that our eyes glaze over and ears go into instant shut down mode the minute we hear them. Relentless over application and regurgitative overuse has forcibly squeezed out of "leadership" the essence of the concept the word once held. The weird thing though is that while the word "leader" itself is cliché and boring, when you come across somebody who actually is a real leader, that person isn't cliché or boring at all; in fact he's sort of the opposite of cliché and boring.
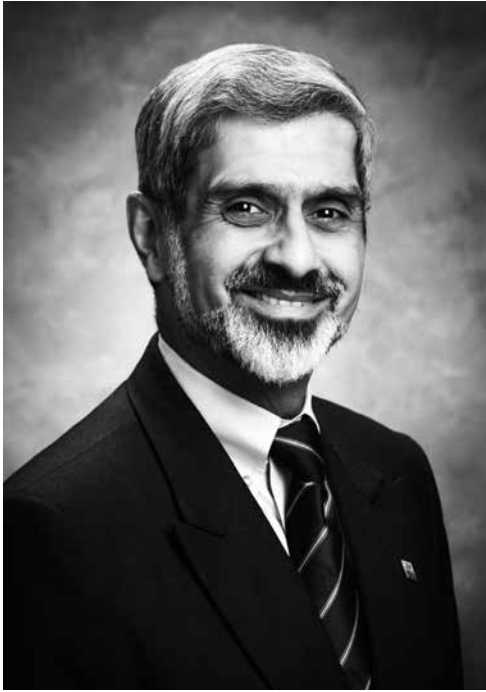
I met Dr. Beheruz Sethna in summer last year when he was visiting the country. From my previous interaction with him, I knew that while was still Professor of Business he had recently stepped down as the President of the University of West Georgia (UWG) after 19 years. Here was a man who had gone over to the land of opportunity in the seventies to form a part of the responsible workforce of doctors, engineers and teachers that character-ised the Indian diaspora of the time. He had gone ahead and broken the mold to transform a modest liberal arts college to a full-fledged university of national repute and in the process becoming the longest-serving univer-sity president in Georgia among both public and private institutions. He is also the first known person of Indian origin ever to become

president of a university anywhere in Amer-ica. Our herd-minded media had gone into a frenzy of patriotic pride the day Nitin Nohria became a Harvard Dean, but they would be hard pressed to know who Dr. Sethna was. But Harvard was already Harvard before Nitin Nohria, while UWG was made to what it is today largely due to the institution-build-ing efforts of Dr. Sethna. Not only that, his transformative contributions in education have led to him being voted among the 100 most influential men in the state of Georgia as many as 6 times!

Corporate psychobabble notwithstand-ing, most of us are curious about impossi-ble-to-define qualities that define leadership and one of the best ways to decipher them is by delving into the lives of leaders. I share this almost biographical interview with Dr. Sethna in the hope that it will enable us to decode some of the mysterious qualities that capture the essence of a great leader.

QB: **Tell me a little bit about you, your early years in Bombay and about your entry into IITB?**

I was the only child of a small middle class family in Mumbai. My father was ex Air Force who worked for a small private firm in Mumbai. My father always wanted me to get into IIT and as early as my ninth standard, my dad cut out the advertisement for the IIT exam announcement to show me that this

it was not available as an option. Still when I went into the interview room; the acting director asked me "what do you want". I said Electrical in Bombay. He said "that's closed, choose another one". I said "I don't want another one" and I left. I didn't want to face my father so I phoned him from IIT to break the bad news. He was upset with me, but by the time I got back home he had time to calm down and he told me "You've done the wrong thing. Doesn't matter now, you study harder,

Dr Sethna transformed a modest liberal arts college to a full-fledged university of national repute and in the process becoming the longest-serving university president in Georgia among both public and private institutions. He is also the first known person of Indian origin ever to become president of a university anywhere in America.

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and appear for the exam again and next time maybe you'll get it."

The second time my father came with me. Even though my rank was high enough to get into EE and there was no X mark on the blackboard, he said "Go in there, I don't care what you do, which department you want to go to, just comeback with the acceptance paper." So that's the story of how I got into IIT, something that I have always been extremely thankful to my father for.

QB: The decision to go to IIMA after IITB was that also prompted by your father? Take us through the subsequent years.

Yes that decision too was prompted by my father. There are two instances of prophetic

is where he wanted me to go. It is a different matter that my grades actually went down after that before they went up. In my tenth I did miserably in Maths and Gujarati simply because I had not studied and prepared well. With some coaching and tuitions I did manage to turn things around in my SSC exam (I got 95% in Maths where I had got 35 in my 10th) and managed to get into St Xavier's college. People might not remember but those days a SSC student was eligible to apply for IIT only after a year of Science.

The first time, my JEE rank was good enough to get me into any other department in IIT Bombay and Electrical Engineering in any other IIT, but not into the prestigious Electrical Engineering program at IIT Bombay that I wanted. Those days there was a big blackboard outside the interview room and the departments that were already full were marked with a big X. Before I went in for my interview I had seen that EE at IITB already had an X mark against it and I knew that

coincidence with my IIM entrance as well. I took the IIM entrance exam at my old college at St Xavier's and the professor who was invigilating happened to be my former professor. I almost walked out without writing my roll number and it was sheer coincidence that I remembered after walking out of the examination hall and fortunately for me my former teacher who knew me allowed me to check and write my roll number down. Without that there would have been no IIMA for me. In my final months at IITB, I already had acceptance

> **I looked them in the eye and told them "remember that all of you had said that in a few years I would move onto a bigger, better, and more prestigious institution? – You were right, I did. And as long as I am President, each day I am going to keep moving to a bigger, better, and more prestigious institution**

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from Jamnalal Bajaj Institute and I would have been happy enough to go there and not to IIM. But while we were waiting for the results, some of my hostel mates had already received their acceptance letters and mine had not come in. It was only during those 3-4 days of anxious waiting that I realized that I really did want to go to IIM Ahmedabad.

While management school was a choice I made as a step in the right direction for a subsequent corporate career, it was at IIM that I discovered I really belonged in the discipline and that I wanted to teach. I worked for a brief 3-month stint at Clarion Advertising Agency during the interim period of waiting before leaving for the US for my doctoral degree. I had admissions into Harvard and

Wharton, but I settled on Columbia University as it offered me the best financial aid, and because the biggest name in my field of interest was there – I ultimately did my dissertation under him.

QB: You met you future wife at IIM?

Yes we did and Madhavi was one year junior to me. It was a campus friendship that had no romantic element to it. Even after I finished IIM we met a few times at Bombay where I was working at Clarion but it was still as friends. It was only when she returned to IIM for her final year and she was of an age when she was technically in the marriage market and we would exchange letters where she wrote to me to tell me about all the different boys she had met that the penny finally dropped. I would promptly write back finding a million flaws in all of them. This went on for some till finally both of us got the message. It wasn't a grand romance; it was more of a realization that it would be nice to spend the rest of my life with this person. We have been married for more than 40 years now.

QB: Did you get into academics immediately after your Ph.D. or did you take up a job? Have you ever taken up a corporate job?

I worked in the corporate world in two stints. The first time was when I was a doctoral student when I worked full time for Lever Brothers, which was at that time the HQ of the Unilever Corporation in North America. After that I joined Clarkson University, Potsdam, New York where I continued till 1979. My wife however always wanted to return to India, so I took a year's leave of absence and we sold off everything except our car and returned to India. I first joined Tatas where I used to work part-time for TCS and part-time for TMTC. I moved to Richardson-Hindustan, now known as Proctor & Gamble, and although I enjoyed the experience tremendously there was some internal turmoil in the company and after a great deal of soul searching I decided to return to the US.

I continued at Clarkson and stayed there for a total of 13 years.

QB: The decision to get into academics – was it by chance or design?

It was by design, but in the first five years there were also a lot of questions within, as I enjoyed both corporate and academic life. It was only in 1981 when I had arrived at a proverbial crossroads with job offers both in the corporate and academic worlds, both in India and USA, that I finally settled on one cell in that 2x2 table – academics in the US. I had the Richardson Hindustan job which was still open while I had an offer from their competitors Warner-Lambert in the US. In academics I still had my existing job and an opportunity to join IIMA in India. I had a tough decision to make and it was then that I decided to return to my academic life in the US, at Clarkson University.

QB: You joined Clarkson University and were there for 13 years in positions of increasing responsibility; then you moved to Lamar University, Beaumont, Texas and then from there to what was then West Georgia College? With your kind of academic credentials and pedigree you could have been anywhere. So the question remains, why West Georgia?

The honest answer is that even today there aren't many presidents of universities from India. My name and background were a disadvantage and unfortunately these differences were far more marked in academic life than in the corporate world. When I got the presidency at West Georgia, I became the only non-white person in the history of Georgia to hold that position in any private or public university (except for Historically Black Colleges, of course).

At my final interview with the Chancellor and Regents, a member told me that West Georgia was a nice place but it had been asleep for the last 20 years. To me the college did have potential but it was not immediately apparent. Barring some exceptional individual

Hostel IV Student Council, 1970-71
Standing: —, Dadi Ratnagar, Hemant Shah, —, Erach Tarapore, —
Seated: Ravi Navare, Behruz N. Sethna, Barkat T. Virani (Hostel General Secretary), Rajiv Ved

students, its overall academic performance was mediocre at best. 51% of the students who enrolled were on remedial education during the first year which meant that they were not even ready for college. This is what I had to and wanted to change. I had a vision before me.

In my speech during my first faculty meeting in September 1994, I told the faculty "We will build an institution where on selected dimensions we are going to be the nation's best, on selected dimensions we will compete against Harvard, and on selected dimensions we are going to beat the nation's best. I don't know what those dimensions are yet, but we will discover them together".

I saw something that others could not see. To be at a place where more than half the students weren't even ready for college and to believe that it could be of national caliber takes a huge leap of faith and a lot of confidence. After the faculty meeting, one of the senior faculty members told me that half the faculty thought I was crazy and the other half knew I was. But I have been lucky and with the help of several exceptional individuals we

did achieve what we set out to do.

West Georgia became a University, and not only that but by the time I had stepped down in 2012, the University's reputation had elevated with enrolment increasing by 50 percent, and the number of remedial students dropping to a negligible fraction of one percent. We obtained new construction and major renovation funding totaling about one-third of a billion dollars for UWG, and in 19 years more than doubled the square footage of an 88-year old campus. As a matter of fact it was in this period that we added more facilities square footage than every other previous presidential administration combined in its 107-year history. We increased investments in UWG's students, faculty and technology by several millions of dollars Approximately 90% of UWG's current faculty members were hired during this period and land holdings were increased by more than 70%. The endowment increased by about 11 times the level it was when I joined. We awarded more degrees than every other presidential administration combined. We won approval for UWG's first four doctoral programs; awarded the first Ph.D. in University system of Georgia history outside of the four research universities and created Georgia's first and only Board-approved Honors College and the Advanced Academy of Georgia (for exceptionally-gifted students to complete their last two years of high school and first two years of college simultaneously); Academy students have gone to the best universities in the world, such as Yale and Oxford. We inherited a college, and left the next president a SACS Level VI University; this is the highest level possible – every top university you have heard of in the region, public or private, is SACS Level VI.

QB: It is obvious that Institution building is what drives you. Are you a driven individual and a workaholic?

Guilty as charged. My vision was all consuming and I would score a big F- when it came to the issue of work life balance. There was some semblance of work-life balance when my children were young, but when they grew up and left for college, my wife Madhavi bore the brunt of my all-consuming passion. When I first came to UWG, most people believed that this was just a jumping-off point till I moved onto a bigger, better and more prestigious institution. I cannot tell you the number of times I had to hear this. I remember that into the 5th year of my presidency I was at a dinner function with the Board of Trustees when I looked them in the eye and told them "remember that all of you had said that in a few years I would move onto a bigger, better, and more prestigious institution? You were right, I did. And as long as I am President, each day I am going to keep moving to a bigger, better, and more prestigious institution."

QB: But this still begs the question, why didn't you? By this time with the list of your accomplishments, your ethnicity should not have been a deterrent? You must have had many opportunities?

There were two occasions when I came very close to moving. The first time was to The University at Albany (what used to be called SUNY-Albany). It was one of New York's four flagship universities and hence a very prestigious position. Presidential selection is a long drawn out process and in the final stages when it was down to the last five at the campus interview, I was the last person to be interviewed. The next day a report appeared on the Albany city press where some members of the Search Committee went public saying that "Dr. Sethna is a clear choice. After that, there is no second, third or fourth choice". In no time the news was all over my campus in UWG.

Our Provost, the second in command, had just moved to an interim presidential position in another university. Another Vice President was close to retirement and UWG was going through a difficult time. It seemed

that suddenly the University would lose its top leadership in one go. It was a simple question from my secretary that sealed my decision. She looked at me and asked "What's going to happen to us?" I simply couldn't do it after that. I withdrew my candidature. When you spend so long at an institution, you become emotionally attached and I could not bring myself to leave.

The second time was an altogether different situation. The university was going through considerable turmoil because of some of the Provost's and my necessary but unpopular decisions. If I had left the university then, there would have been chaos, and I could not make myself walk away from a bad situation. This time there was a revered and respected alumnus, a veteran of WW II, who convinced me to stay back. He looked me in the eye and asked "Would it give you more satisfaction if you went to a more prestigious institution, or to help West Georgia get to that place?"

QB: While talking to you, I get the impression that you are a positive person no matter what the circumstance. Is that so?

Yes I'm very positive. My my wife always accuses me of looking at the world through rose-tinted glasses; she keeps telling me "How can you go through your whole life like that"?

One of the characteristics of pragmatic, positive people is that they don't choose to focus on the negatives but that does not mean that they don't see them. We've gone through a lot of difficulties in our lives. Even UWG went through difficult times with a lot of cut backs and it is not easy running an institution when you have to keep cutting budgets. I used to tell my senior colleagues that I don't care what you might be going through inside, but you hold a public position so always have to walk tall and keep a smile on your face. There is a saying "I don't whistle because I'm happy; I'm happy because I whistle!". There were quite a few faculty members who were critical of my outlook but I've always maintained the

belief that when you are holding a position of influence, you need to radiate positivity. People have to be inspired and motivated by you. I have put in a conscious effort to stay positive no matter how tough things were at home or work.

QB: Let us talk a little bit about lighter things. I need to scrub up the dignified presidential image a little bit. At IIT Bombay you were one of the students responsible for organizing the cultural festival, Metamor4sis. What was the idea behind that?

I've always thought that Metamor4sis was a precursor to Mood Indigo. I was in my third year at that time and the General Secretary of H4. We had enough of the run-of-the-mill hostel functions and we decided to change that. We wanted a really awesome performance for which we invited the best talent in IIT as well as the best talent from town. We had a go-go girl (I must point out that she was fully clothed in a suit from chin to toe) dancing in a cage on the stage that caused quite a stir among the faculty and especially the Director. We had invited the entire Institute including the Director, Brig. Bose. He was away on that day, but when he came back and heard about the event, he was absolutely furious. So I went to his home at night and explained to him that the go-go dancer was fully clothed and there was nothing inappropriate about the dance. He was much calmer after that and I still think of the function as an amazing success.

QB: I've heard a lot of stories that Hostel 4 had a group of 'Mad Bawas'. Share some of your experiences in H4 with us.

The mad bawas were the 4 bawas who lived in a row in one wing in H4. We were a "little" loud at times. I remember one incident where we carried my Java Motor Cycle (it was more of a moped really) all the way up to the top floor because we wanted to get it into someone's room to play a prank. Because we could not get it in through the door, we

first disassembled and then reassembled the motorbike inside the room. When the poor unsuspecting soul opened the door to his room I rode out nearly giving him a heart attack. Another time we stole a monster-like figure that was a prop in a play and placed it in another person's room while he was sleeping. We lit candles around the figure so that when he woke up he was really frightened. The maddest act was when we went to the airport to see the first jumbo jets which had just arrived in India. We climbed over the barriers and walked onto the runway to get close to the jumbo jet. Not satisfied with just touching the massive wheels, we tried to touch the metal body part and were jumping up and down to touch the wheel well. We had only just merely brushed against it when we got caught. Luckily those were the days before all the terrorist threats, so we got off by being just thrown out of the airport. Come to think of it, I guess the 'mad bawas' was an apt tag for us. I hope the statute of limitations has run out on that incident (in 1971); if not, I deny all of it!

QB: **What was the purpose of your visit to India?**

I have always had a desire to work for the underprivileged children. But even though I have been speaking about it with my family for the last 15 years or so, the President's job had been so all consuming that I could not do anything about it. Then, a few years ago two of my aunts passed away leaving me a flat in Mumbai bequeathed in their will. I sold the flat and put the entire sum in a bank and set it aside to help other people. I used the interest generated for the education of underprivileged kids.

There is an orphanage school called Balgram in Lonavala that I had heard about and I was interested in sponsoring the education of a child. With my experience in fundraising for scholarships, I knew that the best way was to create an endowment so that each child can sustain itself without being dependent

on the donor. I started with one child and over the years it went up to eight. Every year when I came to India I would make a day trip to Lonavala bringing the kids some toys and gifts. The children would have fun and learn something, but somehow I felt that wasn't enough. When I gave up the presidency and was a full-time professor, my teaching responsibilities only took up only 10 months, leaving the remaining two months free. So now I can also give something of me (my time) and not just the money.

This year I came to India with two bags full of educational toys and science experiments with the hope of getting most of the students interested in science. My second agenda was to get them to speak in English and use the language in their daily conversations. I used to teach them by first explaining principles so that they learn the hypothesis, and then give them a toy so they can test it through play and practice.

When I asked Dr Sethna if the experience was all that he hoped it would be; he responded by telling me that he had hoped for enthusiasm but what he got was more than what he had expected and that was extremely satisfying. He went on to share that he loved teaching and more than that the learning that happens through teaching - both for the student(s) and the teacher. He explained his experiments and how he had to prepare for these classes with a lot of animation and you could see his almost childlike curiosity and joy even after 40 years spent in the business of teaching and learning.

True to his vision, UWG today does compete against the nation's best on selected parameters. UWG is national leader in the field of undergraduate research. It is nationally recognized in the field of academic debate beating Harvard in four national competitions in the last five years of his presidency. The growth of the University has had far-reaching impact of the local economy with the

Dr Sethna teaching his class

university accounting for hundreds of millions of dollars on the local economy annually. Four times during his Presidency, Dr. Sethna wrote a column entitled "Don't look at me; someone else did it" turning that well-known phrase of apportioning blame on its head and giving all the credit away, naming individuals within the institution to be credited for UWG's transformation. No leader accomplishes the impossible alone. Neither did Dr. Sethna, but others followed where he led.

For me, American novelist, short story writer, essayist, and professor of English, David Foster Wallace captured the best definition of this essence of leadership. To him a leader is somebody who, because of his own particular power and charisma and example, is able to inspire people, with "inspire" being used here in a serious and non-cliché way. This 'power ' or 'charisma', a leader's real "authority", is a power we voluntarily give him, and we grant him this authority not with resentment or resignation but happily; it feels right. Deep down, we almost always like how a real

leader makes us feel, the way we find ourselves working harder and pushing ourselves and thinking in ways we couldn't ever get to on our own.

A leader's life is about giving himself away to causes that transcend the individual. As we leave Dr. Sethna to continue to do that with the children of Balgram, I am left with the conclusion that a true leader is somebody who can help us overcome the limitations of our own individual laziness and selfishness and weakness and fear and get us to do better things than we can get ourselves to do on our own, and I hope that this interview inspires you to do just that. ✳

'Political' Science

ALI BABA

With the spate of *scientific discoveries* being reported by our politicians of late, 'political' science is certainly experiencing *acche din*. But lest we get too complacent, we must be ready for competition. In these days of globalisation, a *discovery* made on one part of the earth (whether it is round or flat, it seems the jury is still out on it) will have consequences on another. So we decided to examine the state of *scientific* developments across the border, for our rivalry is not only limited to cricket. It turns out, they have a lead of a few decades on us in this regard. It was more than half a century ago that they founded the *Council of Islamic Ideology* (CII) to advise and guide their nation on the path to becoming a truly Islamic Republic. That early start has borne fruit and brought them to their present exalted position in the comity of nations. Unfortunately, we are embarking on our path to becoming a Hindu Rashtra only now, but we do have the advantage of knowing where we will reach if we take this path. While they have taken fifty years to achieve it, we can certainly do it in ten. This is not an empty boast; it is based on past performance. See, while the West managed to carry out nuclear fission only in the twentieth century, we had achieved it 'lakhs of years ago'. But it is not only in nuclear physics that we had made advances that the world refuses to acknowledge, glaring injustice has been done to our medical

Christian Barnard performed the first heart transplant only in 1967, while our surgeons had performed a head transplant, probably, 'lakhs of years ago', without any of us realising it until it was pointed out to us recently.

science too. Christian Barnard performed the first heart transplant only in 1967, while our surgeons had performed a head transplant, probably, 'lakhs of years ago', without any of us realising it until it was pointed out to us recently. But we are loosing our focus, let us get back to our neighbor. When the government of Pakistan recently tried to ban marriage of under-age girls, the CII promptly stepped in and declared the ban un-islamic, thus saving the nation from committing a grievous sin. What role models they could be to our *khap panchayats*! Maulana Mohammad Khan Sherani, Chairman of CII, announced last month that women could not object to their husbands taking a second wife (or subsequent wives) because such objection is un-islamic, since what their husbands are embarking on is permitted by the Quran. Not surprisingly, he became an instant hero to a section of Pakistani males. The CII declared the use of DNA testing in rape cases was un-islamic as

Sharia required evidence from four male muslim witnesses. No weak apologies here about 'boys make mistakes – will you hang them?' The learned maulana declared after a meeting of the Council last month that no woman could be appointed a judge of a hudood court that will try rape cases because – you guessed it – it is un-islamic. Even if grudgingly, we must accept that this guy has what it takes to pull the nation back a thousand years. We too need a messiah to take us back from this Kalyug to the Swarnyug, 'lakhs of years ago'. Perhaps we may have found one in the person who is currently rewriting school text-books in Gujarat.

Another milestone during Pakistan's journey was the International Conference on Scientific Miracles in the Quran and Sunnah, held in 1987. It required a stroke of genius to come up with the concept of *Scientific Miracles* – though some may think it is an oxymoron – and credit must rightly be given to Gen. Zia-ul-haq who also inaugurated it. This conference was organised by the International Islamic University and the Organisation of Scientific Miracles based in Mecca. Some of the objectives of the conference were to (1) Affirm the existence of *scientific* miracles; (2) Prove that all known scientific facts can be traced to either the Quran or Sunnah; (3) Validate new conjectures related to physical phenomena, ostensibly based on the holy texts; (4) Condemn secular *Western* science.

A pioneer in the field was Sultan Bashiruddin Mahmood. He was one of the stalwarts of the Pakistan Atomic Energy Commission, and was concerned about providing energy security to the world. In 1998, he suggested to the Wall Street Journal that jinns could be tapped to solve the energy crisis. He said, 'If we develop our souls we can develop communication with them' – 'but every new idea has its opponents', he went on to lament. You can say that he has an en-jinn-eering solution to the energy problem of the world. But unfortu-

Blow up by Yoko Shimsu https://www.flickr.com/photos/bibliodyssey/sets
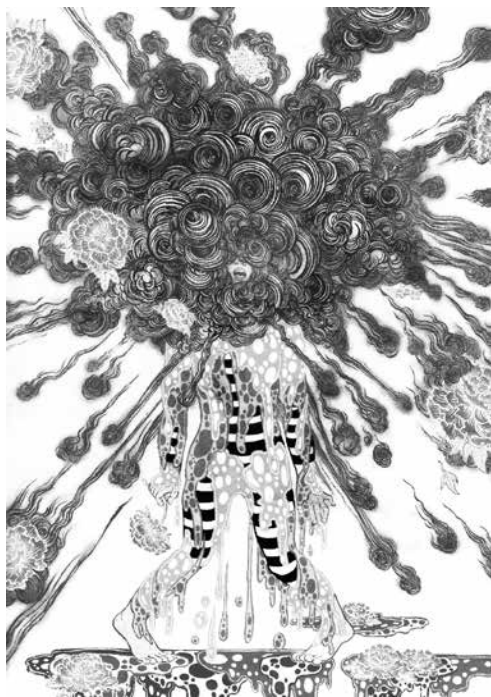
nately, he is currently barred from leaving the country, probably at the behest of oil companies who do not wish to see their revenues plummet if his innovative ideas reach the ummah. One can see the impact of these efforts at promoting an Islamic scientific temper on the media as well. Whenever there is a natural calamity in Pakistan, learned maulana's are invited to TV studios to discuss the possible reasons for this *khuda ka kahar*. It invariably turns out that the un-islamic behavior of the people is to blame, though often it is the people of Quetta who pay for the sins of the people in Islamabad. A kind of Newton's Law that we have seen play out in our country too.

The Quran, it seems, is a virtual treasure trove of scientific ideas. No sooner is a discovery made or a theory proposed, than evidence of its being foretold is found in the Quran. In light of this we in India need to study the Gita more carefully, perhaps even

declare it to be our National Scripture. And since the Gita came to us 'lakhs of years ago', while the Quran was revealed only fourteen hundred and thirty-six years back, we can claim all discoveries that took place before the seventh century, besides those yet to come. As our beloved PM has said, let us make (it up) in India. ✳

Prof. Aliasgar Qutub Contractor

Prof. Aliasgar Qutub Contractor, former HoD of Chemistry Department, former editor of Technik, and former Dean Alumni and Corporate Relations, is an alumnus from C'73. Endowed with a rare gift of narrating serious and heavy matters with a tongue held firmly in cheek, his incisive and informed views on IIT Bombay and alumni relations are in evidence in his column Sim Sim khul ja. He is currently 40 thieves short of his target.

From a Jogja Jungle

JAYA JOSHI

I was in Jakarta for two nights and even though meeting two Afghani men and listening to their tale of human trafficking was a riveting one and watching a Korean film with Indonesian subtitles was a moving experience, I was still eager to leave the city. I wanted cheer, more human contact, some foliage and less concrete.

Jogja (officially but rarely called Yogyakarta) is a major tourist destination in Indonesia. It is the capital city of the province of Yogyakarta Special Region, which is in the southern part of the Central Java province. It was a recommendation that was being echoed by lot fellow travellers. The reasons, however, had more to do with its geography and history than its cheer and foliage. It has many wonders – an active volcano, Borobudur, Sultan's palace, and its food – but for me the biggest draw to the place was Omah Jogek.

Omah Jogek is a jungle homestay or something like that in Jogja. An Indonesian couple, Ina and Bandizt, who have zero business sense and use all the proceeds for rescuing animals, runs it. Besides the wild, their other passions are punk rock and mucking about with friends.

I stumbled upon it after dedicating fervent hours on the internet while smoking a cigarette and sipping tea in my dimly neon-lit hotel room. Though I didn't know what I was looking for, but knew there was a pang in me that was strangely being addressed by what I was reading on Omah Jogek.

This is what Ina's description on Air BnB read:

"*It's in the woods, with lots of wooden parts.*

The name's in Javanese, literally means *Barking Home*. I guess you can sense now where that will lead you. Yes, a must-love-dogs home, well, must-love-cats, too. We built the house after borrowing money from my dad (and we still owe him a lot). I hope he would always have other much more important stuffs to think about than my debt. There were no cats so we didn't name it a *Meow Home*, but we keep getting discarded and abandoned kittens around. There is no option available but to look after them. We cannot eat them, of course, because we're vegans.

Some of the cats are up for adoption".

I'm a shameless cat lover and had been missing mine from back home. I saw the pictures of Omah Jogek and there was nowhere I wanted to be more than that place. There was one little problem though. No, money was not it as it was pretty affordable. It was the booking that had to be done online exclusively through Air BnB website. Unfortunately, my credit card is linked to my Indian cell number and as I roamed around Southeast Asia on local numbers, I couldn't use the card for any online transactions.

The good thing was that one could correspond with Ina over Air BnB's messaging

much but the bed reminded me of my bed in that tiny room while growing up in Dehradun. As soon as I hit the pillow I dropped off into deep, undisturbed slumber.

It was the gentle purring of two cats – one curled next to my cheek and the other at my feet that finally awoke me after who knows how many hours. It was a good sleep and I was hungry. I looked around and found the room to be done in a simple, understated, elegant and utterly comfortable manner. It had

This life's journey has been so puzzling at times that my desire to find out more at those times has never been completely quenched.

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open red brick walls, Oakwood, unpainted furniture, and a beautiful original canvas art of a Dutch painter who lived in the neighborhood. There was a small window with curtain that overlooked a creek below.

I was already feeling cheerful and there was more to come. I went outside the room and was welcomed by chirpy hellos from Georgia and Alessandro who were sitting on stone benches next to the river with their coffee, bread, and cigarettes. Perfect, just perfect! I rushed inside the kitchen to get some for myself and quickly joined them at the bench.

Georgia, a comedienne/pub singer/art student is a wild stream from Tasmania with bushy armpits that she rebels to shave. She had the brightest voice and most chatty eyes. The kind of person, you would want to bring home and have tea with and talk and talk. She had come to Indonesia with very little money on a sponsored art project in North Sumatra that fell apart. But like me, she was so taken by Omah Jogek that she decided to use all her saving to spend indefinite time at the homestay. Alessandro, the sweet, gentle, utterly attractive Italian bald was a recover-

system. However, in order to ensure that the booking is done only through the website and not directly through the owner, Air BnB restricts exchange of any emails or phone numbers. No matter how innovative you get (interspersing numbers in text or reversing the digits), they can catch you and remove all traces of it from the message – very clever of them. Both Ina and I tried them all and failed. But then I was lucky to have Ina on the other side who agreed to let me stay without paying for the room in advance.

The next morning I was there before the break of dawn after eight hours of train ride from Jakarta. I don't remember much of the way from the station because as soon as I transferred the direction given to me by Ina to the taxi driver, I promptly dozed off on the back seat of the car. The driver woke me up as we reached the guesthouse. I looked around and suddenly I was in the middle of a jungle. It was swell. The dogs were barking and Bandizt came out, took my bags and showed me to my room. I was too bleary to notice

ing cracked-heart who lived in London. He worked for an NGO doing some completely forgettable social work and was touring Singapore on work. He had some holidays left and decided to come to Omah Jogek. Whatever the reason, I was just glad to be there at the time they were there.

This life's journey has been so puzzling at times that my desire to find out more at those times has never been completely quenched. But sitting next to Georgia and Alessandro, I felt a calm surrender inside of me. At the time, nothing seemed to matter. Was it the loud barks and constant miaows? Was it the rustle of leaves from the tall trees? Was it the gurgle of the flowing creek? Was it the simple organic bread and jam breakfast? Was it the active ashtray with several burnt butts? I really don't know. I had hardly exchanged a few pleasant words with both of them, but was already in love and ready for Jogja.

Of course I saw most of the sites that had to be seen in Jogja. I went to the Sultan's palace, climbed all the tall stairs of Borobudur. Woke up in the dark of the morning to climb a mountain and see the sunrise from behind the volcano. Drove up to the volcano on motorbikes ridden by young Javanese kids. Saw the remains of an actual house believed to be of a mythical king of Mount Merapi. The saintly man who kept the faith and continued praying while the volcano erupted and village evacuated. We made impromptu music directed by Georgia on the Gamalan (Indonesian percussion instrument) and some other broken instruments kept in the king's desolate house. Each and every moment spent was so happy that it seemed like I was living a dream while awake.

We wandered aimlessly around the streets of Jogja, talking to strangers, eating Nasi-something and smoking some more. There were post dinner beers in the front patio of Ina's house under starry skies. All sat around playing the guitar and singing out of tune while stealing lyrics from our iPhones. We cooked and ate together and fed ourselves something much more than food.

Here's an ode to these strangers from that jungle in Jogja. It's an ode to Ina, Bandizt, Elly, Fandi, Alessandro, Georgia, Leo and Bindi and Buster and Pumpkin and Hansen and Chichi.

Omah Jogek is
A home that houses animals
And it's not the just the four-legged ones that
seek refuge for a refuge they needed to seek
for long
It's a place that calms your nerves
Agitates those molecules and
Dissolves them too
It barks and miaows
It lets you have a voice and
Muffles the city noise
It cooks and jams and stirs up a storm
Every moment unique.
Each one too special
And living it up is the norm
Time stands on a vertical plane and passes

was too, too sunny. I returned with an almost burnt skin and an intense tan. So smother yourself with a good dose of sunscreen.

Jogja lies in one of the most seismically active parts of Java and has been repeatedly struck by earthquakes and volcano eruptions. The worst in recent times was the earthquake in 2006, which killed over 6,000 people and flattened over 300,000 houses. In October 2010, the nearby volcano of Mount Merapi erupted, spewing lava over nearby villages and

I'm a shameless cat lover and had been missing mine from back home. I saw the pictures of Omah Jogek and there was nowhere I wanted to be more than that place.

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killing 353 people. Going by the past record, it'll be another 2-3 years until the next small eruption and 10-15 years until the next big one. So pay a visit while you still can!

The three of us drove with Leo to the foot of the volcano and then hired three loud motorbikes driven by three spirited Javanese kids – 15, 14 and 16 years old Fatima, Abu and Murtaza. Sitting behind them, scaling Mount Merapi was an experience that became special because of their stories. We stopped in between to soak it all and saw some sites that had to be seen. The three of them showed us their homes that were frightfully close to the volcano and spoke about the recent eruptions with impressive matter of fact-ness. Without a single suggestion of being overwhelmed, for them, it was just a mountain that spewed lava once every 3-4 years and destroyed parts of or the whole village. Once it was done with, the villagers went about putting their houses together and getting on with their lives. That was that.

Being one of the oldest cities in Indonesia, Jogja also has many heritage buildings and

in a blink
It's sullied and curried and stewed and soaked
It'll make you think, un-think till the chink goes to the brink
As for me, if I begin to recount what all I miss of Omah Jogek
The days will run short and ink will run dry and I will still not be able to put a lock
On the stock
Of the sweetest barrel
I have some memories in pictures but the best ones are in my head
And I have a feeling they'll keep churning out through the said and unsaid.

Getting around Jogja

Barring a singular slim attempt at learning how to ride a bicycle, I saw most of Jogja as a pillion rider on motorbikes behind Leo, Alessandro or Georgia. I also used the cycle rickshaw or *becak* (pronounced beh-chak) or simply walked. Hiring a becak is ridiculously cheap and you don't even need to bargain. I was there between mid to end March and it

monuments. Borobudur is one of world's truly great ancient monuments, the single largest Buddhist structure anywhere on earth, and few who visit fail to be taken by both the scale of place, and the remarkable attention to detail that went into the construction.

History tells that Borobudur lay abandoned and hidden for centuries under layers of volcanic ash and thick jungle growth. Nobody knows for sure why it was abandoned, although the popular theories are that the local population just became uninterested when there were mass conversions to Islam in the 15th century, or they were simply driven away by large volcanic eruptions. It was never forgotten entirely though, with local folklore ensuring that stories of the great monument lived on.

Today it is a major tourist attraction. Alessandro and I climbed to the top and admired the views. A curious observation was seeing the chopped off heads of Buddha as a result of Islamisation of the country, especially Java. It was initially believed that Islam penetrated Indonesian society in a largely peaceful manner and was brought in by traders from Gujarat, India in the eleventh century. So to imagine these peaceful Muslim raiders chopping off the heads, as they had to be chopped and keeping intact the glory of the monument does demonstrate a level of religious tolerance. A fair amount of the temple is restored but I was glad that they did not try to place the heads back as it reminds you of two distinct periods in history.

Another place that should be visited is the Sultan's palace. If one has seen the forts and palaces in India, this one is a fairly ordinary one. But what it lacks in majesty, it makes up for what it stands for. The Sultan, a Muslim, observed both Ramadan (Islam's religious observance) and Dusshera (a major Hindu festival) with equal fervour. Being a Hindu myself and coming from a country that is steeped in religious diversities, it was extreme-ly interesting to observe a sort of a mish-mash of Hindu, Islamic and Buddhist traditions in the palace museum. There were no clear demarcations and all religions were merged into one quite easily.

How to reach Jogja

I arrived by train from Jakarta and the ticket cost me USD 9. To get to it from India, check out cheap air connections from Air Asia. Try to be flexible with time and catch cheap deals on the airline. Before buying your

It was the gentle purring of two cats – one curled next to my cheek and the other at my feet that finally awoke me after who knows how many hours.

ticket, always consult Skyscanner or Kayak once. It tracks all the best deals.

Accommodation

I stayed at Omah Jogek. To book from Air BnB, it just costs USD 20, which if you ask me is a very small price for what you get. Though I have not done it myself, it is worth a try to connect with them through their Facebook page for a booking enquiry. But if you're not a cat/dog person, another good option is ViaViaJogja. A bit more expensive but a good option if you're excitedly looking for things to do and places to go. Hostels usually cost around USD 12 per night for a shared room and USD 24 for a double private. Prices will be up to half the price outside of the major cities. Most hotels begin at USD 27 per night for a double room.

Food

Food is cheap. You can save a lot by sticking to street food. You can pick up tasty local fare for around USD 50 cents! Street side snacks, soups, and noodles will keep your wallet fat! Markets are your best bet for finding seriously cheap food. Western food is more

GORGA
LUCY
2014

expensive but is still affordable at around USD 9 for a meal and drink.

Visa

Indonesian visa is available on arrival for Indian passport holders and cheaper than getting a visa from India. It costs: US$50. There are hardly any queues so I don't know why would anyone go through the trouble of getting the visa stamped from before. ✳

Jaya Joshi

Jaya Joshi is an ex-specialist, current generalist, penniless, compulsive, urban, single, mostly solo, full-time traveler. She lives, earns a little and saves as much to travel. After 15 years of presentations, press releases, PR events, cocktails, kissing in the air, high heels, Jaya decided to move. She moved with no certain plans, ambitions, strategies and road maps but with a large, thinly explored map of the world and very little money. She writes sparingly but when she does it is about her encounters with strangers, what the travel did to her, the impressions she came back with and the crevices it underlined. Jaya is the former PRO of IIT Bombay and blogs about her travels at http://twotornshoes.wordpress.com/

Under the Blue Jade Moon

KARTHIK K.S.S.

You may not know me, nor my name,
For I am but a mere spectator.
But I will let you know that I have done
A lot more, than be a humble spectator.
I have lived in the most humble abodes,
Sometimes even in a hole in the ground.
I lived in the grandest of castles imaginable,

Sometimes alone with none other around.
I have had my share of beginnings,
Sometimes starting out as just a babe.
I have been known to be magnanimous,

More times than one, everyone's bane.
I would set out on an adventure,
Sometimes it would end up finding me.
An adventure it was nonetheless,

Good or bad, it was all up to me.
I sometimes solved the greatest of mysteries,
That baffled even the skilled detectives.
Sometimes I set out in search of love,

Or just for the rewards and incentives.
I crushed my enemies with weapons galore,
A sword, a knife, spear, cudgel or axe.
Sometimes I used the greatest weapon, my mind,

To solve puzzles as flames gobbled up wax.
Tremendous knowledge, terrible magic,
Infinite wisdom, all in my arsenal.
I was sometimes but a foot soldier,
But sometimes, a warlord or cardinal.

I have seen epic battles fought in the skies,
Where the sky itself rollicked, or bled red.
Sometimes a battle of words and emotions,
Or quarrels for water, shelter and bread.

I fought alongside heroes of ages long gone,
Ones yet to come and ones who may never.
I fought against heroes and waged wars,
Never hesitant or backed down, whatsoever.

I have seen the unspoken horrors and terrible truths,
Of battlefields and the devastation and loss.
I have seen the aftermath of disasters, natural or not,
Endured them, survived them, coped with loss.

I have lived through famine, disease, flooding,
And all. I suffered and yet helped others survive.
I was at the brink of meeting my dear friend death,
More than once, but somehow I did survive.

I brought health, wealth and prosperity and joy,
Was hailed as the greatest heroes of them all.
I brought disease, losses and misery and death,
I was shunned away, the most evil of them all.

In the end, I always would find my way back,
To my home, to my humble or grandiose starts.
A changed being, conscience or intelligence I was,
Satisfied with my efforts, opportunities and parts.

Now it is time for a new journey, a new adventure,
One that may take me to other worlds or not.
I may get to make new friends, or meet old ones,
Such beginnings sure are fun, more often than not.

The once azure skies are now dark and starry,
I pray as I lay on the lush green grass under a shade.
Oh mighty book, where will you take me next,
As I lay under the moon that shines like a large blue jade.

K S S Karthik
B.TECH '14, CSE,H8

 K S S Karthik is an alumnus of IIT Bombay from the Computer Science and Engineering department. He is currently pursuing his masters in the same department at Northeastern University, Boston. He is interested in game design and development, sketching, writing poetry and fiction, especially epic fantasy and science fiction. His blog : http://adayinfantasia.blogspot.com

The Biggest Difference

ANTARIKSH BOTHALE

In a very beautifully written article (KEE-GAN: The Opposite of Loneliness), (Late) Marina Keegan, then a final year student at Yale, said:

"We don't have a word for the opposite of loneliness, but if we did, I could say that's what I want in life. What I'm grateful and thankful to have found at Yale, and what I'm scared of losing when we wake up tomorrow and leave this place.

It's not quite love and it's not quite community; it's just this feeling that there are people, an abundance of people, who are in this together. Who are on your team. When the check is paid and you stay at the table. When it's four a.m. and no one goes to bed. That night with the guitar. That night we can't remember. That time we did, we went, we saw, we laughed, we felt. The hats."

And this is what the biggest difference for me has been after leaving IIT. Most of the 'material' things can be easily replaced. You can get fairly fast Internet even outside IIT. You'll almost certainly have a better standard of living too. But it's difficult to get back the opposite of loneliness.

When you're in a residential college, 'hanging out' just happens. You stay in a wing with 20 people who you've grown with and who've grown up with you, and there are hundreds more in close proximity who you can reach in a jiffy. You are all in it together. Batch-mates, seniors, juniors, with their lives all tied togeth-

> **Most of the 'material' things can be easily replaced. You can get fairly fast Internet even outside IIT, for instance. You'll almost certainly have a better standard of living too. But it's difficult to get back the opposite of loneliness.**

er by countless invisible threads.

In college, when you want to hang out, you drop by someone's room.

When you are outside, it's not so straightforward. Schedules need to be matched. Plans need to be made. Traffic and transit times need to be accounted for. For virtual hangouts, you have to make sure everyone's free in their respective time-zones. There might be friends who don't mind hanging out but will never initiate anything themselves, and you might occasionally wonder whether you're the only one who cares. You're still 'hanging out', but now it's this distinct activity, and you set it off from other activities of your life, such as 'work'. There's no more the spontaneity of just dropping into someone's room because you were bored of studying for the mid-sems, or taking a quick stroll to the canteen or the juice center at midnight, or the warm comfort of just being with people you love in a collective space that you all truly consider your own,

Don't take me wrong. I don't intend to paint an unnecessarily dark story, and it's really not as gloomy as it may sound. A lot of us might have felt this way even when we left school and made our way into college. At least I did. But we made new friends, and most of us now consider our college days to be the best days of our life. So, it's not gloomy at all. We'd soon stop missing college. We'd enter new relationships. We'd marry. We'll surely move on. Humans are fairly resilient that way.

But every once in a while, I will crave the easy comfort of the opposite of loneliness. ✳

Antariksh Bothale
DUAL DEGREE, ME, 2012

Antariksh Bothale (Dual Degree, ME, 2012) finished his Dual Degree in Mechanical Engineering from IIT Bombay (2007-12). After working as a consultant at A.T. Kearney, he did an MS in Computational Linguistics from the University of Washington, Seattle. He lives in the Bay Area and is working at Bloomreach.He is passionate about languages and linguistics and also maintains a blog on the same—Linguistrix.

and I am not talking of Mumbai's chawls.

Now, I understand that the opposite of loneliness isn't something everyone cherishes equally. If you're the quiet, introvert type, it's perfectly understandable that you'd find the constant flux of humanity that you encounter in college pretty tiresome. But even then, I imagine you'd also have a small comfort group who'd always be easily accessible and whose company you'd not find easily once you get out of college.

Without the easy lubrication of proximity, it can get difficult to keep relationships well tuned. You may find many conversations starting and ending with elementary courtesies and niceties. (What's up man? Long time! Yeah, nothing much. Job life. What's up with you? Same here). It's not that friendships have weaned. It's just that distance makes every interaction a task in itself, and distances can sometimes be good but harsh litmus tests for which people matter the most to you.

On Being a Dean: The Challenge Of Academic Leadership

DR. KRISHNA S. DHIR

Academic leadership has been sought from established leaders in government, military, corporate, and other institutions. However, there appears to be a dearth of willingness, and often even ability, to serve as academic leaders. Why should academic leadership be different from leadership in other institutions of society? Indeed, there are reasons why academic leadership is different from leadership, say, in the military or in a corporate organization. Academic organizations are composed of scholars, who investigate complex ideas and ask difficult questions that encompass the theoretical and the empirical, and the hypothetical and the practical. An academic organization is expected to create, disseminate and apply knowledge, in addition to performingthe conventional organizational tasks of planning, organizing, staffing, and control.A new member of the community of scholars spends multiple years in intensive study, as a probationer-learner, prior to being promoted as, say, Associate Professor or Reader. Usually it takes well over a decade to establish adequate credibility to be appointed a full Professor. Credibility as a scholar plays a major role in academic leadership. In the military, or in other hierarchical organizations, rank plays a crucial role in the flow of information and performance of tasks. It is not surprising that the majority of academic leaders come from within the academia.

Success as a scholar does not in itself

In contrast to the long probationary period of scholars, very few first-time deans begin their jobs with adequate training

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qualify one to be an academic leader. In contrast to the long probationary period of scholars, very few first-time deans begin their jobs with adequate training. One reason why their challenges have inherently complex dynamics is that many of the issues shaping them arise from sources external to academia. The socio-economic demands confronting academic institutions are altering the purpose of education. Where democratic societies emphasized the need to create an educated citizenry for well-considered socio-politico-economic decision making, now education is being emphasized as a way to secure means of livelihood in an environment shaped by the evolving knowledge economy, globalization of business, and workforce diversification. Business organizations, competing globally, are redesigning their business models, usually without collaboration with the academia. Additionally, to stay competitive in the changing environment, businesses seek education as a commodity, packaged in short-term courses that are delivered in convenient modes, requiring least disruption in organizational routines. To the extent that academia is unable

to respond to the emerging needs, they are deemed irrelevant by the very stakeholders they seek to serve.

Academic organizations are not composed of homogenous cultures. They have at least two distinct cultures. The culture, and also the philosophic milieu, in which deans function is quite different from the one in which scholars, comprising a faculty, exist and operate. Generally, a teacher-scholar in an academic faculty works alone. At best, as a member of a collaborative team, a faculty member operates in relatively small groups. Faculty members schedule uninterrupted blocks of time during which they avoid intrusions by others. In contrast, deans deal with various distinct and disparate issues, concomitantly. At best, deans may sequence their activities through fragmented time periods on a number of concurrent tasks or issues. Unlike faculty members, who highly prize their autonomy, deans are expected to be accessible at all times to a wide range of stakeholders.

As stated by Dahringer[1], "Being a dean involves a great deal of time dealing with faculty – faculty who when tenured are not subject to hiring/firing/disciplinary/reward practices commonly found in the corporate world." Deans do not have the corporate 'tools' of "sticks" and "carrots". Shrinking academic budgets do not allow even basic incentives a dean might offer individual faculty members. Generally, faculty members see themselves as independent, intellectual contractors, in spite of the corporate structure of a College or a University. "Consultation" is the number one management tactic reported by deans. A very close second is "working towards a higher goal," while the number three ranked tactic is "discussion and reasoning with involved parties".[2]

Faculty members are loyal to their respective disciplines. Deans are driven by their institution's vision, mission and goals. Although a dean hopes that the vision and the mission of the institution are based on common, shared values, the fact remains that scholars are influenced more by their academic associations, where they share their research with peers. Also, deans do not have the luxury of professing as faculty members do. Instead they

Unlike faculty members, who highly prize their autonomy, deans are expected to be accessible at all times to a wide range of stakeholders

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get their job done by persuading the faculty members and others to alter their agenda to serve the administrative goals of the institutions. The paramount role of persuasion in an academic organization has profound implications for how a dean might approach the conventional organizational tasks of planning, organizing, staffing, and control. The divergence of the cultural and philosophical orientations of the faculty members and deans or department chairs can provide many opportunities for miscommunications, misunderstanding, and conflict.[3]

A crucial point often overlooked by faculty members, especially the ones in earlier phases of their respective academic careers, is that academic governance is not a responsibility solely of the deans. There are a number of tasks that lie in the domain of the faculty responsibilities. Yet, few faculty members familiarize themselves with the challenges of academic leadership in academic institutions.

1   Dahringer, L. (2008). A Dean on Deaning. In K.S. Dhir (Ed), *The Dean's Perspective: Issues in Academic Leadership in Schools of Business*. Atlanta, GA: Decision Sciences Institute, Georgia State University.

2   Dahringer, L. (2008). *Ibid*.

3   Gmelch, W.H. (2000). Leadership Succession: How New Deans Take Charge and Learn the Job. *Journal of Leadership Studies*, 7 (3): 68-87.

For instance, the task of developing, designing and delivering a curriculum normally resides with the members of the faculty. So does the associated responsibility of assessing the extent to which student learning is accomplished. Just about all activities required to meet the educational needs of the various stakeholders reside in the realm of faculty activities. After all, that is where the intellectual capital of the institution resides.

Usually, deans become deans at the

> ## Usually, deans become deans at the suggestion of others, often at the urging of others. Generally, one does not embark on an academic career with an expressed desire to be a dean. That is quite rare.
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suggestion of others, often at the urging of others. Generally, one does not embark on an academic career with an expressed desire to be a dean. That is quite rare. Yet, Williams[4] describes the job of the dean as "the best job on the campus." A dean is in an excellent position to impact the full spectrum of academic outcomes and all who have a stake in them. However, the mentality of a chief executive officer does not apply to this job. "A "CEO mentality" in academia is a bygone area."[5] In contrast, the chief academic officer accomplishes all goals through orchestration of activities of others, both within and outside the institution. The essential prerequisite is a desire to serve others and to contribute to the development and achievements of others.

The dean's responsibilities make a never-ending list. Decreasing public funding is raising the pressure to seek external resources through fund-raising. Increasing societal and accreditation-relatedregulation, in a litigious environment that constraints rapid change, demands unprecedented managerial agility. The evolving environment in which an academic institution must operate places immense importance on the strategic planning process. The strategic plan must enable continuous quality improvement in all processes through which the academic unit functions, including the processes through which faculty members are professionally developed and make intellectual contributions;curriculum is developed, designed, and delivered; students are recruited and serviced; and goals of institutional outreach are met. These are just a few items in a dean's evolving job description. The basic task of the dean is to bridge the cultural gap that exists in the academic unit. The fundamental requirement for success as a dean is passion for all attributes of the intellectual pursuits: knowledge creation, sharing, and application; teaching and learning; developing faculty, staff, and students; and serving the society through attainment of the academic organizational mission. ✳

Krishna S. Dhir
B.TECH C'66, CHEMICAL ENGG, H6

Krishna S. Dhir is the Dean of the College of Business and Economics at the University of Hawaii at Hilo. He served as Vice President of BioStar Medical Products and a pilot-plant manager with Borg-Warner in the US; and an executive of CIBA-GEIGY in Switzerland. Elected Fellow of the Operational Research Society in 2004, he served as the President of the Decision Sciences Institute during 2011-2012. He holds a Ph.D. from the University of Colorado.

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4   Williams, D.Z. (2008). A Personal Perspective 'On Deaning', Dhir, K.S. (2008). *The Dean's Perspective: Issues in Academic Leadership in Schools of Business*. Atlanta, GA: Decision Sciences Institute, Georgia State University.

5   Williams, D.Z. (2008). *Ibid*.

Exploring 'The Third Curve' with Mansoor Khan

BUMBLEBEE

Mansoor Khan studied engineering at IIT, Cornell University and MIT but then went on to make four feature films including Qayamat Se Qayamat Tak and Jo Jeeta Wohi Sikander. In 2003, he moved to Coonoor, to realize his first passion of living on an organic farm. His first book, 'The Third Curve – The End of Growth as we know it' explains the limits of growth in economy and industry from an Energetics perspective. In this interview we try to find out more about him as well as his book
Bumblebee

BB: Tell us a little bit about the 'The Third Curve – The End of Growth as we know it' and the central argument being made in the book. In other words, - your take on the energy predicament of the nation.

MK: For a start I never really wanted to be part of the entertainment or film world. I always knew that I wanted to move out from the city and live in a non-urban environment. But while I was trying to make that happen, I had to do something responsible to kind of redeem myself in my parents' eyes. I had wasted enough of their money in my academic pursuits and other things and it was time to face the real world. So I dug inside me to see what I could do and there was a bit of a story-teller in me that I decided to explore and that is how the films happened. And all this while I was making my effort to move to a farm. Somewhere in between I became aware of the other side of life that we are not told about in our mainstream education. We are fed with an industrial perspective of productivity and growth and development with very little consideration about what it entails and what will be the backlash of this kind of merely quantitative outlook to life. And so when my land where I planned to move and that of 30,000 other villagers came under the threat of acquisition for the development of an airport, I was forced to think about these things. What exactly do we mean by development and what are the other implications of it. What I studied is what is missed out completely from our education and belief system. And that changed my complete world view. One thing led to another and my research in defending my land led me to understanding energy and Peak Oil issues that relate to Limits of Growth and eventually lead off the complete environmental and human crisis that we are witnessing presently. It is common sense really, but as I read further and spoke to people I realised how little people were aware that energy drives the economy and so you better learn the limits and laws of energy.

BB: Tell us a little bit about the 'The Third Curve – The End of Growth as we know it' and the central argument being made in the book. In other words, your take on the energy predicament of the nation?

MK: The central argument of the book is that exponential economic growth started because we found cheap and dense energy in

Mansoor Khan

The availability of fossil fuels and most other resources follow the laws of geology which is a bell curve. When you reach the top of the bell curve in terms of extraction rate, then it can only go down and that is exactly what happened with oil reaching its global peak in 2005 as predicted by the renowned geologist King Hubbert in 1970.Hubbert incidentally was working for Shell oil and not some doom saying tree-hugger. Today 72% of the world's oil producing nations are in steep decline.

> **The central argument of the book is that exponential economic growth started because we found cheap and dense energy in the form fossil fuels in 1750**

Based on this people like us were predicting the impact it would have on world economies when oil peaked in 2005 and that is exactly what happened in 2008. The global economy collapsed as oil is the true driver of industrial and economic growth.

Remember our modern industrial world runs not merely on available energy as in from the sun but on a humongous store of 300 million years of sunlight called fossil fuels that we were lucky to stumble upon in 1750. That level of energy availability started the industrial age from use of coal to oil to natural gas. These 3 sisters are the energy base on which our modern industrial world has been built and designed. This tremendous store of energy allowed us to grow exponentially for the last 250 years and that has conditioned us to believe that this kind of growth is possible for ever. So we have designed our money, banking, financial and industrial systems premised on compounding interest and returns which will on last till we reach the top of the bell curve of oil. So if you talk about the energy predicament for our nation, it is even more dire. We

the form fossil fuels in 1750. Before that global GDP was steady and a very low figure. Since then we have designed and built our world on not only fossil fuels but also the by products which are unique to fossil fuels and cannot be replaced by any other alternative. And the reality of fossil fuels or any resource that we get from the earth is that we get in the form of a bell curve. Slowly at first then rising to a peak when half of that resource is over and then declining permanently. We reached Peak Oil in 2005 and that is the prime reason for the 2008 economic collapse. Ever since we have been on a plateau and will shortly start a permanent descent in available energy. Thus real economic growth is over and we are now in economic shrinkage globally.

This is because the true currency of the universe is energy and not money. While you can get energy out of the ground at ever-increasing speeds, the global economy can grow in a real sense. But sadly the earth is finite, and even more the earth starts giving you energy slower when only half of it is depleted from an oil well. This is a geological fact not taught in any education system anywhere in the world. That does not make it less true.

are a country of 1.3 billion, with no significant oil trying to ape a western model of development and 7% compound growth. Yes it happened for a while and that gave us tremendous goodies and the delusion that this can go on forever. But the energy reality begs the question – "How you are going to run this just 20 years down the line?" The implications are logically dire if we believe that we can repeat what the US did (and now collapsing) and that too after half the energy and resources are over on this planet. Traditionally there are far better ways to design our world only if recognise the fallacy and impossibility of perpetual growth. Chasing infinite growth can only lead to collapse, which is what the first world is facing and that is why they are coming here in a great hurry to exploit our balance cheap resources in order to make their money grow. We are importing a model of chasing growth through consumerism and blatant development for the sake of growth. Mark my words, we going to rush down the same tunnel and bang our heads really hard at the end. What a way to plan the future for ourselves, our kids, our animals, plants, rivers, forests and everything that we so lovingly call India. A country that was once the seat of wisdom and now sold out to a delusion called Growth.

BB: Can you elaborate a little on the idea of an Energy Descent and how it is going to impact our future?

MK: Like I said, the availability of all resources follows a bell curve. You start extracting slowly and then the rate picks up until it reaches a peak and beyond that it only declines. This is true about all our energy sources and in particular of fossil fuels. You have to remember that it is fossil fuels that started the concept of growth in 1750 when we first started using coal and that kick-started the industrial world. It was the available cheap energy that started the industrial mode of manufacture, production and plenty. It was not some great idea that started it.

Most people are under the illusion that we generate energy. We don't and we never have. We only extract it in the form of fossil fuels. Other so called forms of generation like solar, wind, nuclear are nothing more than energy converters as they are all basically built with fossil fuels. And even worse they only generate electricity that does not fundamentally run our modern industrial world which runs 87 per cent on fossil fuels. Even more, the very fabric of our modern industrial world is built

So we have designed our money, banking, financial and industrial systems premised on compounding interest and returns which will on last till we reach the top of the bell curve of oil

with the by-products of fossil fuels like bitumen, plastics, lubricants, fertilisers, insulators, etc. and those you don' get from any of the so-called alternatives. So when fossil fuels descend down the bell curve that is called Energy Descent and that intrinsically shrinks the way we run our world. The idea of money growing becomes false and all our financial systems are premised on the assumption that we can generate compounding interest by increasing our production of goods and services. When money cannot grow legitimately we make up imaginary means of growth like share prices, options, derivatives and hedge funds which are intrinsically betting models and we count that as real growth to perpetuate the myth in our minds that perpetual growth is actually possible and happening.

And the truth of that gets revealed eventually as we saw in the 2008 global economic collapse when we reach and cross the era of cheap energy. That is what is called Peak Oil that people like me are aware, studying and

trying to make the mainstream understand. There are many more corrections like this to come if we remain in denial that growth is over and that we should shape a sensible and smaller world. There is absolutely nothing wrong or scary about that. That is the way the energy descent is already taking us whether we want to accept is or not. My book starts with a simple thought - 'Deal with Reality or Reality will deal with you'. Energy descent is a reality that we need to understand and accept.

When money cannot grow legitimately we make up imaginary means of growth like share prices, options, derivatives and hedge funds which are intrinsically betting models and we count that as real growth to perpetuate the myth in our minds that perpetual growth is actually possible and happening

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Only then can we shape a secure and healthy future. And if you ignore this reality then reality is in no mood to negotiate with you. As Ayn Rand said, 'you can ignore reality but you cannot ignore the consequences of ignoring reality'.

BB: The idea of a growth model or calculations of progress in terms of GDP may be faulty, but do you genuinely believe that a shift in national priorities from current growth trajectories to a more steady state and pace is actually possible. Or is it just a Utopian dream?

MK: Yes of course the current trajectories will be affected and that too not in a steady state direction but in a very definite descent pattern till we reach down to the real ener-

gy budget of our planet which is sunlight. Sunlight is the true income of energy on this planet and is far less and in a completely different form from how we have designed our world to run. Moving from 300 million years of stored sunlight to real-time sunlight implicitly means energy descent which spells end of growth. So how on earth are you going to increase GDP? It is not a matter of choice. Like I just said, end of growth is a non-negotiable geological and thermodynamic reality and not the figment of a Utopian dream. In fact GDP chasing was an illusion. You can only increase Gross Domestic Product in a real manner when you have more and more cheap energy and resources to produce more and more products and services whether they are needed or not.

Oh and another wonderful irony of GDP as a measure of well-being is that GDP goes up whether you make machine guns or medicines for man-made diseases. Great arrangement won't you say? Does not make much sense to me as a measure of well-being in any case. In fact in my book I show the positive correlation between our exponential chasing of GDP with the exponential decay of all life systems on this planet. Yes chasing GDP is the root cause of all the converging crises we are seeing erupt all over the planet. But then again that was not out of choice but out of the possibility that fossil fuels provided for a short time.

So yes the choice is before the nation only if the understood the non-negotiability of energy descent. The national priorities of chasing an impossible goal will meet their own painful end because of the limiting laws of Energetics. It is not a moral argument or imposition. Very important to understand this. I have mentioned this at the beginning of our book. Insisting that we will make growth happen against these odds is a dangerous and losing battle.

To understand the intricacies of the pre-
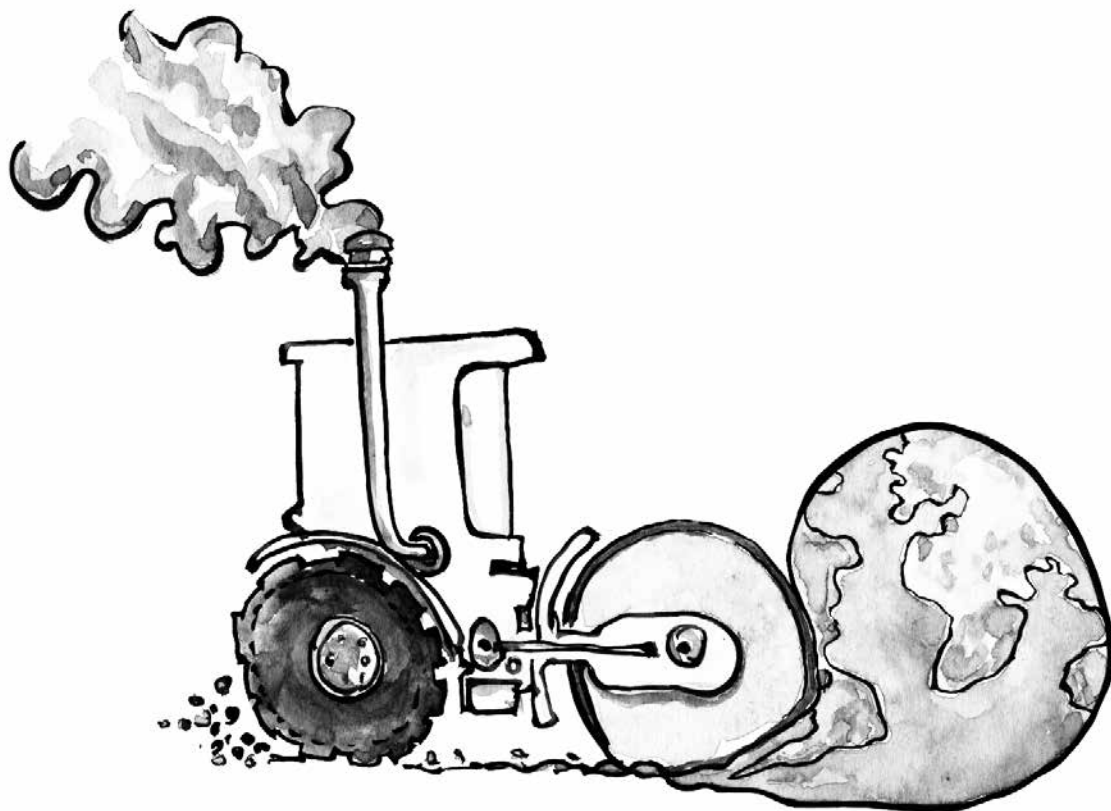
Frits Ahlefeldt available at http://www.hikingartist.net/

dicament of energy I would recommend that people read and research the many excellent books and literature on the subject. I have given plenty of references at the end of my book.

BB: Current growth models are based on an economic model of continuous consumption. Can this trend actually be reversed given the common aspirations of the average Indian?

MK: My last answer explains this. Just because Indians have been misled to aspire for perpetual growth-based models does not mean the reality of resource and energy availability is going to changes its laws. This is a frequent argument I have faced when I give lectures on Energy and the end of growth. It sounds like a spoilt child crying for bigger and bigger toys and not recognising the limited ability of his parents (in this case the earth) to provide them. The Earth is limited and no amount of crying or moral or economic pleading can change that.

BB: How do your formulations of growth correlate and address the issue of the economic realities of rural and urban poor. How do you balance out ecological imperatives with the developmental needs of the majority?

MK: For a start, my argument is not ecological. My argument is geological. I am not saying that we SHOULD NOT have growth. I am saying we will NOT BE ABLE to have limitless, exponential growth because of the laws of Energy Descent and a finite resource base which needs to be understood in great detail. So everyone including the poor will have to deal with this. And let me tell you, honestly a far better world is possible that is not premised on perpetual growth. Just because people live with less does not mean we lead a qualitatively inferior life. Sounds hard to believe because we have been fed with the idea that growth creates prosperity and well-being. Sorry this is completely wrong. Well-being has nothing to do with growth. In fact perpetual growth is a mode of cancer that

automatically affects well-being by depleting and destroying life supporting systems like water tables, forests, rivers, clean air and bio-diversity. The last chapter of my book talks about the transition that we need to make from a quantity-based paradigm to a paradigm that the rest of nature actually follows. Once again this is not a matter of choice. It is happening anyway. We have to recognize it and move in sync with it. When the tide goes out you don't argue with the moon.

> ## The most surprising thing I learned is that the less formally educated a person is, the more easily he or she understood the obvious idea that it is not possible to have perpetual growth on a finite planet
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BB: Where did you get your inspiration or idea for your book and how long was it in gestation?

MK: I became aware of Peak Oil and Limits to Growth and related subjects as early as 1999. It made sense to me straight away and so I started reading extensively on the subject. There is a huge community of people, including people in the oil industry and other disciplines, who are studying and talking energy realities. They were predicting the financial collapse post global Peak Oil. When the Financial Collapse eventually happened in 2008, I thought there would be lots of people who would write about this in India but no one did. India is sweetly unaware of the energy aspect and so is busily making false and dangerous plans to expand and grow that has already proved disastrous in the first world countries. And so we want to go and make the same mistake. Imagine a country with one quarter the land mass, four times population

and no oil of its own making plans like the U.S. in the second half of oil availability on the planet. This is a sure recipe for doom. And we can see the signs in our unstable economies.

BB: What was the hardest part in writing this book?

MK: The toughest part was to constantly remind the reader that my argument is not a moral one but a reality and possibility one. Because we have recently become so aware of the environmental and inequity aspects of our present world we assume that this is what is being said and so the energy descent argument becomes reduced to an environmental argument. Sorry to say this but you can look at your own questions too. You asked me in 3 different questions in 3 different ways about how people will not accept this or that we needed to grow for some reason and put aside environmental consideration a bit. I am saying something even more blatantly bold. I am saying even if you throw environmental consideration out of the window and we remove all environmental clearance hurdles and we allow digging every mountain, cutting every forest, damming every river and plundering every coal, oil and natural gas source - you still will not be able to make growth happen because all these resources are in descent as per laws of geology. So to constantly keep drawing the reader's attention to the IMPOSSIBILITY of growth rather than the IMMORAL aspect of perpetual growth was the toughest part of writing the book and answering your questions :-)

BB: What was the most surprising thing you learned while you were writing the book? Any interesting anecdotes to share?

MK: The most surprising thing I learned is that the less formally educated a person is, the more easily he or she understood the obvious idea that it is not possible to have perpetual growth on a finite planet. Our global mainstream education system conditions and brainwashes you to believe that it is possible. And
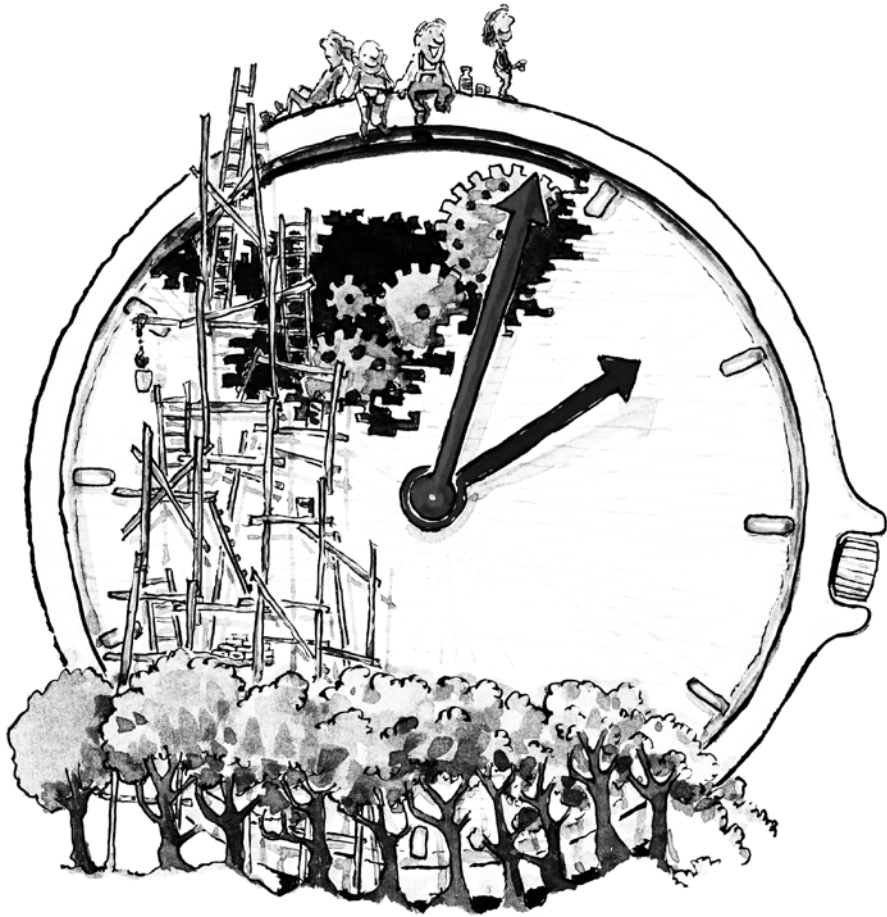
Frits Ahlefeldt available at http://www.hikingartist.net/

we actually waste so many precious years of our life to get deluded. Wonderful. As I always say that to understand that perpetual growth is firstly impossible and secondly a form of cancer, you need only a small amount of common sense but a whole lot of honesty.

BB: What kind of feedback did you get from your readers?

MK: I got stunningly positive response from my readers and the audiences where I have spoken. This included professors, students, finance people, CEOs, chartered accountants and policy makers. The list of venues where I have spoken includes all the 4 IIMs, Indian School of Business, The Energy & Resources Institute in Delhi, Foreign Services Institute (New Delhi), Cognizant,

Allegis, Yahoo, Morgan Stanley, CII groups, IIT groups, Symbiosis Institute of Business Management (Bangalore), Commits Institute of Journalism (Bangalore), Bombay Chartered Accountants Association (Mumbai) and 3 TEDx talks. You have to listen to my 1 hour presentation that takes you systematically through the energy argument to understand where the flaw in our mainstream economic understanding is. It is because we think it is money and capital that runs the world whereas in fact it is energy. Money is a map of energy and resources in fact. So we can make the laws for money which becomes economics but we cannot make the laws for energy the discipline for which is Energetics. All systems from an ant to a complete eco-system instinc-

tively and honestly follow energetics. They grow only proportionate to available energy and when that declines they shrink. Only we got the illusion that we could grow forever because found a humongous stash of stored sunlight capital in the form of fossil fuels and that is allowing us to soar upwards for a while. Short while I must say because we have burnt half of a 300 million year store of energy in just 150 years. Please do the accounting and tell me if this enterprise called the modern industrial world can run like this for long.

And my audiences and readers got it so strongly that they were demanding that I take it a wider audience through a film. Easily said. Film is not the best medium to communicate this paradigm shifting reality. You know what is going to convince people the most? It is the reality of Energy Descent unfolding day by day that we are not recognising as the root cause. We are calling it all kinds of other things like weak administration, policy failure, liquidity crisis, corruption and what not.

MK: Initially I was very keen on engineering but as my thinking expanded I felt that is not what I wanted to do as a profession. I also became aware of my innate urge to move away from the urban. This was tied up with my questioning of mainstream industrial paradigm, the 9 to 5 world and made chase for material growth. It all added up in my mind and I started planning to find a place outside Mumbai city to settle down in. But along the way there were other events that completely transformed the way I look at things I found then getting increasingly at loggerheads with the mainstream. As time goes by, I feel that I was correct and the choices that I was making at a personal level are also universally true. One needs peace, harmony, a healthy envi-

ronment and limits to growth to be content. Everything that we are told is in the opposite direction. And you can see the result of that in the modern industrial world. The irony is that the bubble of this illusion is bursting not because somebody is convincing people to change their minds. Reality of energy and resource shrinkage is doing it naturally.

MK: This is the same as the last question. I never wanted to make films so I never lost interest. I was doing it as a stop-gap activity. I did the best I could with my films but the plans we always to get away and do what I am doing now - living in a small town on a farm and studying and writing about the converging crises that the world is facing that are all actually intimately connected with the dangerous and illusory idea of perpetual growth. As economist and educator Kenneth Boulding said 'Growth for the sake of growth is the ideology of a cancer cell'. Think about it. We are behaving exactly like a cancer cell on the body of the earth. No wonder it is dying. And we call it progress!

MK: I am planning to take the thoughts of my book further through various other mediums that are easier to access and assimilate like a stand-alone PowerPoint presentation, a short film and hopefully a full length film. The last one is not easy as the subject is a bit academic and hard to translate to a feature film format. But I will explore every medium to communicate this. I do have 2 other books planned but they go way beyond this subject. Can't tell you more on that yet. ✳

Dew and Frost have the Same Soul

DR. SUDHIR SHARMA

As the old adage goes beauty is in the eyes of the beholder. However, certain physical phenomena violate the age old wisdom. For example, who would not find dew drops on a flower to enhance its beauty even more than the flower itself? The present article I have tried to show the beauty of dew drops and frost crystals by taking macro photographs of condensate on various surfaces, flowers, leaves, plants, etc. Regardless of the surface the beauty of these nature's wonders is always visible.

Basically, in very simple terms dew formation is condensation (nucleation and growth) of perfectly spherical water drops on a surface when relative humidity in the atmosphere is high and the surface cools below dew point due to infra red radiation. Though the nucleation of water drops appears to be at random and yet one finds a nice symmetrical pattern and alignment in the condensation of dew drops. Frost on the other hand forms in solid state and grows in a hexagonal crystal structure shining like diamonds in sunlight. Both are chemically the same (hence I call it having the same "soul"), two hydrogen atom combined with one oxygen atom forming water which is so essential for the life to grow and sustain on our planet. The difference in the physical appearance is obviously due to the ambient temperature - dew forms if the ambient is above the freezing point while frost forms below the freezing point of water.

Dew

Photo1 shows tiny kalanchoe (a succulent plant) buds with dew drops. These buds are about ¼ inch in length and 1/8 inch in diameter, thus the dew drops are very small less than 1mm diameter. This is a macro picture and is enlarged to show the dew drops clearly. This photo and the following photographs were taken in early to mid morning hours since as the ambient temperature rises with the sun both dew and frost evaporate and disappear!!

Photo 2 shows tiny wild weed flowers and leaves with dew drops. Dew drops have also formed on web threads woven by very small spiders. The white flower is about ¼ in across which looks like a giant in comparison to very small dew drops the web. The ambient humidity is very high, about 94% resulting in more dew condensation on the plants.

Photo 3 is that of a coriander (Dhaniya) flower. These flowers are very pretty and again very small. The whole flower cluster is not more than 1 to 1.5 in across with smaller flowers within the cluster. These flowers show beautiful dew drops condensed on them. Some drops are larger than the others indicating these nucleated much before the smaller drops.

Photo 4 is that of a seed pod of a yellow dandelion flower (yes, the same one that we try to eradicate throughout the summer from our lawns). Tiny dew drops form wherever the conditions are right. You can see almost microscopic dew on very thin hair like seed stems. These drops grow with time until meeting the adjoining drop when they could

become bigger by coalescence or stay the same if surface tension forces prevent their merger.

Photo 5 shows a pink mum flower which is totally engulfed by the dew drops. The ambient temperature is about 40 F and 89% humidity. This is a larger flower, about 2 inches in diameter in full bloom.
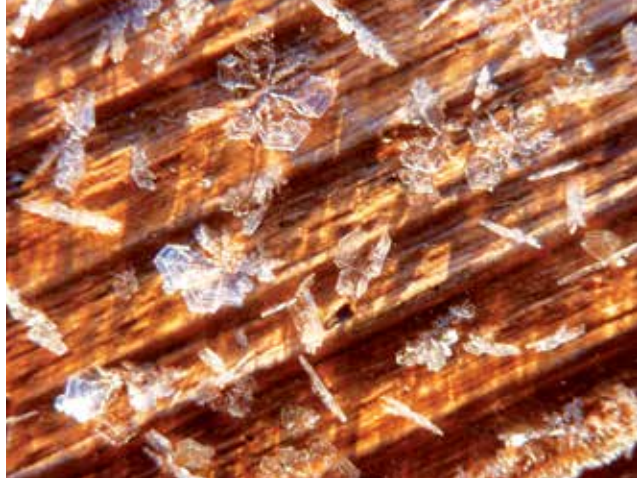
As the ambient temperature drops below freezing point (0C/32 F), the water in the atmosphere condenses or nucleates on the surfaces as ice crystals called frost (which is synonymous with *"paala"* in North India, when it gets extremely cold below the freezing point and frost falls, people say *"kal raat ko paala pad gayaa"*). The ice crystals have a hexagonal close-packed arrangement of water molecules. The close up macro photos of the frost crystals appear like diamonds from the sky that fell overnight. Here are a few photos of the frost.

Photo 6 (above left) shows frost on mum flowers. Unlike most of the plants these flowers are pretty resistant to the frost damage for the first few times and after that they die

of cold. One can see needle like frost crystals growing on the mums.

The crystalline structure of these frost ice crystals is clearly seen in Photo 7 (above right) where frost has grown on a wooden table. The size of these crystals is about the size of rice or wheat grains, 1/8 to ¼ in. These really seem like diamonds fallen out of the sky. The photo also shows shadows of these tiny crystals on the table due to the sunlight from rising sun.

Photo 8 (below) shows frost crystals formed on a red car body. It was extremely cold on this day, about 0F (- 17C) with about 80% humidity. These crystals are some what larger about ¼ to 3/8 in. The crystals seem to grow almost in two dimension as seen from
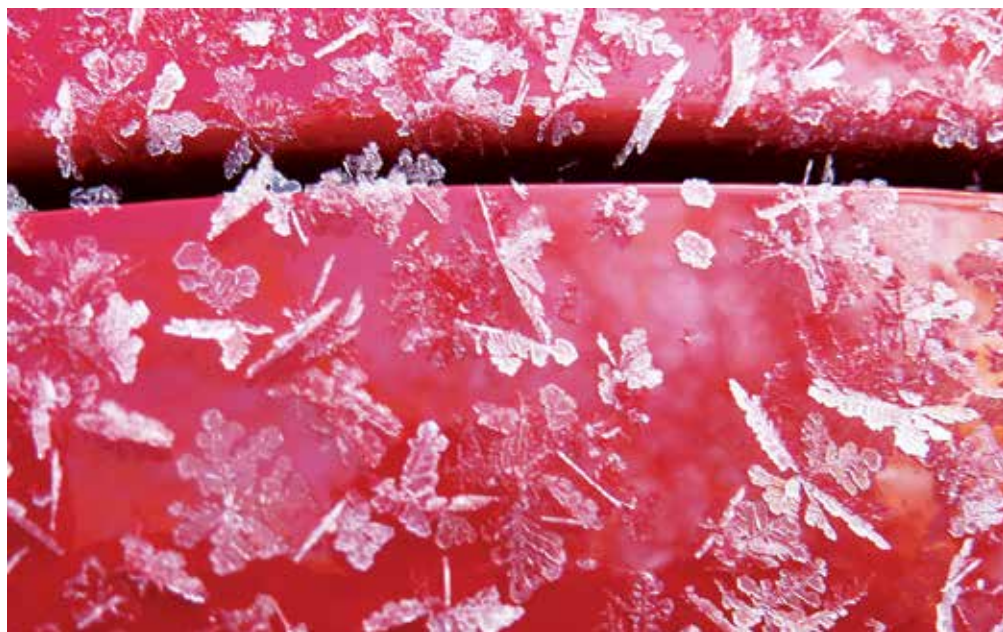
the top view looking like a needle while others growing at an angle or horizontally show hexagonal type structure.

Photo9 shows frost crystals growing on a dried fallen leaf (about 1 to 2 inches in size) on the ground. The temperature and humidity were 20F and 73% respectively.

Nature's magic is available to see almost every day as seen from the preceding photographs and one must enjoy it as often as possible!! ✳

Sudhir Sharma
B.TECH., MEMS, '62

Sudhir Sharma is from the very first batch that joined IIT Bombay in 1958 and graduated (B. Tech., Metallurgical Engineering) in 1962. He obtained his Masters degree from McMaster University in Canada and Ph. D. in Metallurgy and Materials Science from Carnegie Mellon University in Pittsburgh, USA. He spent his entire career in R&D and consulting in iron and steelmaking in USA and is author of thirty five research papers. He is also the author of a coffee table souvenir book titled "The Pioneers, Story of the First Batch of IIT Bombay, 1958 – 1962" which was published last year on the occasion of Golden Jubilee Reunion of graduation of First Batch.

After the Cyclone

TINKERBEE

The golden-rimmed sun,
has risen back upon the battered land.
A land, which had a cover of green paddy.
A land where there was a dusty road,
frequented by strong-headed bullocks and sturdy farmers.
It also had a factory with a siren
that blared every day at 5'o clock.
There were the hamlets,
by which there were cowpens
with a pair of Durga and Gauri,
and there was also a fat, stumpy cock.
There was the sea-
the dearest friend of the people of this land.
It gave food to the poor and joy to travelers' band.
But nothing is left.
Neither the paddy,
nor the dusty road,
Neither trees nor cows,
or the hamlet and the cock.
The sun is dim and mournful,
entwined between the leafless branches-

shivers the haunting full moon.
Among tons of corpses,
I do see a tiny broken courtyard,
Where an old toothless lady sits-
lighting a small deeya
by the wind-ridden Tulsi plant,
Shivering and starving;
yet praying,
to send back her nineteen year old from the unknown land.*

The poem is written as a tribute to the thousands of families and households in Eastern India that get affected and are rendered homeless by cyclonic storms ravaging the land year after year.

You

TINKERBEE

When the red lips of the last rays,
give their final smile
and close over the darkening horizon.
When the fragrance of summer blossoms,
Weigh heavily on the night sky.
When the long tresses of the dark night,
plaited with moon and stars,
unknots its mysteries and magic.
When the light breeze,
Creates its own rhythm
and an unknown music-
Then, I do dream of you!
But you! Who are you?
For I have neither seen you,
Nor have I heard you!
But, it feels I have known you
From, I know not when….
I know not how.
But who are you?
My hidden strength?
Or my dark weakness?
You- concealed in the caves of the night,
and in the glare of the day.
I can see you not-
But can feel you,
like incense in the air,
and like the sweetmeats,
sold in the village fair.
You! Whoever you are!

Whether near,
Or far-
I wait for you
to come for me
in the shadowy chambers of my heart…

Tinkerbee

A new bee of the bee-town, Tinkerbee loves tinkering around with forms of writing and is in quest for new genres of creativity. An alumni of the batch of 2010 IIT Bombay (Department of Humanities and Social Sciences), the Tinkerbee researched on the theories of Mikhail Bakhtin and the fiction of Amitav Ghosh for her doctoral degree. She is currently working as Assistant Professor in Humanities at IIT Gandhinagar. The Tinkerbee has a passion to explore intersections between literature and philosophy, between theory and practice, and between life and creativity. She believes that a little compassion and some poetry in life can make the world a better place to live.

Eh? Oh!

BUNKUMBEE

I am Bankim Biswas and what I write is a lot of bunkum and wishwash. I've written this bumkum play. I live in the middle floor because I'm a 50-something pleated trouser, striped polyester shirt wearing "papa" of this play. Downstairs lives my 80-something father who is the *dada*, and upstairs is my 20-something son who calls himself a "dude" for a reason that has not percolated downstairs. Enough of the preamble and let's now amble into the play. Curtains are moving up to the tune of "kal, aaj aur kal".

Name of the play: Kal, Aaj aur Going Forward.

Dramatis Personae:

Dada, white-haired, 80+, pipe smoking, safari suit, reclining on an armchair.

Papa, greying at the temples, reading glasses, dressed as mentioned above, about to retire from Kirloskar Cummins, swivelling on what else? a swivel chair.

Beta, aka Dude. 20+, earphones sticking out of ears, FBing away on his Mac, arm-chairing on a recliner, a purple T-shirt which proclaims "I scored last night" and shorts bulging with 6 pockets.

Act 1, Scene 1. (Don't miss this. Last scene. Play ends before intermission)

Beta: Hey Gramps! I need to touch base with you. Need to bring you up to speed on what's trending.

Dada: Eh?

Papa: He wants to talk to you.

Dada: Oh?

Beta: Gramps! Like me and some other dudes want to get into a joint venture with like-minded folks and set up a consortium with mentors, clients, vendors, venture capitalists and other stakeholders including benefactors and our end-user segment.

Dada: Eh?

Papa: He wants to open a partnership firm with everyone he knows.

Dada: Oh?

Beta: To explain the key takeaways from this idea, I've generated a collateral that I want to share with you.

Dada: Eh?

Papa: He wants to show you some papers.

Dada: Oh?

Beta: We want to focus on key areas centred around development. For instance, we can bring in some value-added services in a vertical. Maybe, the healthcare sector.

Dada: Eh?

Papa: I think he wants to open a hospital.

Dada: Oh?

Beta: As a strategic measure, maybe we can start with a low-hanging fruit and tell our customer base why they need to avail of our services that could be tied up with benefits that we could outsource to specialist vendors.

Dada: Eh?

Papa: He wants to tell patients that they are sick enough for him to get more doctors.

Dada: Oh?

Beta: Gramps! Just think! We think out of the box. We have skill sets that will bring about a paradigm shift, once we bring it to the table.

Dada: Eh?

Papa: He thinks nobody has built a hospital till now.

Dada: Oh?

Beta: Wait! If you want, we can take this discussion offline.

Dada: Eh?

We can create action items and focus on key deliverables of our mission statement that has strategic objectives and operational goals which we can benchmark against key performance indicators based on best practices that we have picked up from no-brainer websites that are not rocket science.

☙

Papa: He says that when you go to the loo to pee, he'll follow you and tell you about the same hospital.

Dada: Oh?

Beta: We can create action items and focus on key deliverables of our mission statement that has strategic objectives and operational goals which we can benchmark against key performance indicators based on best practices that we have picked up from no-brainer websites that are not rocket science.

Dada: Eh?

Papa: He says that he will do some work.

Dada: Oh?

Beta: In case it helps, I can google for healthcare centres and forward you their coordinates and some user ratings on the services they provide.

Dada: Eh?

Papa: He'll show you the address of Agarwal Hospital where you've been going for 40 years and he'll tell you how they check your blood sugar.

Dada: Oh?

Beta: Well Gramps! What do you think of our business plan? What are the key takeaways you want to focus on? What is the funding you will bring to the table? If you're asked, "What's in it for me", what are the 3 high level points you want to focus on?

Dada: Eh?

Papa: He wants to know how much money you'll give him.

Dada: Beta! I›ll help you if you start a real business instead of doing all this.

Beta: Eh?

Papa: Beta! Your gramps is saying that you must demonstrate something tangible in your output and position your goals correctly.

Beta: Meaning?

Papa: If you say "I want to open a medical shop and sell aspros and anacins", your Gramps will put up the money. If you say that you want to assist the healthcare sector with retail support for the ever-expanding analgesic market, he will not chip in. He wants to know exactly what you're doing. He wants to know what you'll make.

Beta: What should I make? Where should I make?

Papa: Make anything. Make mosquito coils. Make aeroplane horns, make copper sulphate. You can even make sugarcane juice or ice golas that your Gramps made in Surendranagar before he educated all of us. Gramps will help you if he knows what you're making. And remember this ... you have to MAKE IN INDIA. ✳

The Mumbai Local

DEEPAYAN BHADRA

The day starts as early as 4am for the Mumbai local trains. The Mumbai local barely manages a 3 hour sleep. I feel sorry for it. Given the way it devours more than half of Mumbai's population into its compartments; it surely needs more rest. Does it not? The Mumbai local is a legend in itself, easily counted as one of the foremost things you must experience in the bustling metropolis. I had been a *Mumbaikar* (or rather a *Bombayite* as I still prefer to let Bombay remain Bombay) for two years and yes, the locals had been a way of life for me.

Rarely anywhere else do you find such meager value for human life. Thousands of nameless, faceless human beings crowd the locals and travel through days and nights to multiple destinations across Mumbai. A first-timer is certain to feel daunted. Take it or leave it but don't hang midway. Yet more often than not, it turns out to be effortless. You stand there still and then the impact of a dozen or so people behind you automatically sucks you into the bulging stomach of the compartments. If you are unlucky enough (as I have been at times) to be carrying luggage, make sure that you flash that pretentious smile to your co-passengers. Be not surprised to find someone else's hands tucking into your shirt or your body. . They are not gay and it is purely a matter of chance! Somehow, the locals truly reflect the very essence of Bombay. They are a test of the phrase "survival of the fittest". If you devote yourself completely to your vocation here, Bombay will repay you richly. Hard work runs through every vein of maximum city.

For the ultimate experience, try catching the Churchgate-Virar fast, the mother of all locals. Amateurs may need to be on high alert. Once you settle down, the magic unfolds. Each face tells a story in itself. Be it the usual office-goer, or the couple managing to gaze into each other's eyes despite the commotion, or the laborer cribbing about his pay, or the woman fearfully carrying her infant in her arms, Mumbai indeed is a hotbed of unlimited diaspora. Friendships are forged, professional networks are strengthened and dreams are rekindled. The city paints many different hues each day that the next moment seems so refreshingly different. If you have a taste for all things Indian, you cannot but fall in love with Bombay….

P.S: Fast forward to Tokyo, Japan. The child is grown. The dream is gone now. The locals here are a sharp contrast to their counterparts in Bombay. Given that the local trains in Tokyo are technological marvels and the Bombay locals are still enmeshed in the colonial era, nevertheless, there's something amiss here -- that is called emotions. ✳

Deepayan Bhadra
M.TECH '14, AERO,H12

Deepayan Bhadra is a Masters student of aerospace engineering at IIT Bombay. For some years now, writing has been a way of life for him – a form of self-expression. He has been privileged to have some of his articles published in some newspapers and also the H7 magazine! He hopes that this article will strike a strong chord with the readers.

Humans are Accumulating Net Negative Karma!

RAGHU MURTUGUDDE

Every religion has something to say about God, heaven, hell and rebirth. I prefer the God theory of Steven Jay Gould which sticks to the Occam's Razor principle – if you hear something in the dark, you begin to walk faster. If it is nothing then you didn't lose anything, but if it is something that could harm you then you have gained a head start on making an escape. Life is like a walk in the dark and you don't know if there is a higher power or not. By being mindful about the possibility of someone watching your every move, you do a few good things and hope to gain good Karma.

And the Hindu religion has a leg up on the whole Karma theory. Just like the Newton's law, every action has a corresponding reaction or result. The Karma theory considers good and bad as relative, so it is not prescriptive about your actions. The fruits of your Karma are to be enjoyed or suffered in this life or in later lives. As the Buddha said, there is suffering and there is a cause for suffering.

The Karma that is not ready for enjoyment this life is transferred to your future lives and so you can be born with a baggage of bad or good Karma. Well, this obviously leaves us with a serious dilemma about why the suffering afflicts children before they even comprehend Karma or the mentally-disabled who do not understand the cause but feel the pain.

Karma theory would assign all suffering to the bad Karma one earned in one's previous life. Your bad Karma offers you an opportu-nity for reducing the deficit of good Karma by blessing you with a sick or a handicapped child or a dependent. Is it all a way of allowing the human mind to deal with the helplessness of the situation? What is the natural state for a human mind? Can it really be happiness if there is so much suffering around us all the time? Or is it equanimity to deal with the inevitable pain but making suffering optional?

Can rebirth explain the super-exponential increase in population during the last 100 years? Are other animals being born as humans? Can humans be born as other life forms? The Karma theory says you can move from one life form to another. So if you are fond of eating a lot of meat, then you could be reborn as a carnivorous animal.

Well, that should explain the population growth then! And here is how it would go.

Humans love to kill. Even though the planet has so much to offer for all species, humans kill each other and other species at will. Putin and the Ukraine, Assad and Syria, the drug lords of Latin America, conflicts between Israel and Palestine, ISIS' murderous rampage across Iraq, and so on. If we have evolved to kill, then we must be reborn as willful killers, i.e. humans. We are thus accumulating bad Karma with each generation and being reborn in larger and larger numbers instead of moving to other life forms like zebras which live mindfully and do not kill wantonly *(http://en.wikipedia. org/wiki/Why_Zebras_Don't_Get_Ulcers).*

Frits Ahlefeldt available at http://www.hikingartist.net/

The suffering we see all around is the net accumulation of bad Karma with each generation. But there is good news. Birth rates continue to fall, mostly because of the education and empowerment of women (*http://www.pewsocialtrends.org/topics/birth-rate-and-fertility/pages/2/*). Rather counterintuitively to what one would expect from evolution, the educated and wealthy women want to have fewer children – mostly to ensure that each child has a good standard of living (*http://www.unm.edu/~melaniem/MosesBrownEcolLet2003.pdf*).

The net bad Karma is being reduced for each generation thanks to the educated and empowered women! We will reach a steady state in the coming decades and net bad Karma will be zero and birthrates will equal deaths and maybe some humans will even be lucky enough to be reborn as mindful zebras! It will be a peaceful and cooperative world of unselfish genes and cooperation will indeed

trump conflicts, as Mark Pagel argues (*http://www.ft.com/cms/s/2/b6685630-62d3-11e1-9245-00144feabdc0.html#axzz39pfNnCin*). ✳

Raghu Murtugudde
B.TECH AE, C'83

Raghu Murtugudde is an '83 Aero alum following which he continued to sell firewood with his father in Dharwad for 6 months and returned to Aero as a project scientist. He went to the US for an MS in Aero from UT-Arlington, and a Ph.D in ME at Columbia Univ. During his stint at NASA and as a faculty at UMD he took his CFD expertise to climate modeling including climate impacts. He has been engaged with NGOs on sustainable agriculture methods and research on human mind and its limitations in accepting risks that are not obvious and imminent like climate change.

Tinkering IIT Bombay Style

DEWASHISH KUMAR DEY

Something has bothered us for the few years of our stay in the institute. After quite a bit of soul searching and walks across the dim lights in the institute, it wasn't difficult to find out what is the abstract thing that has been so unsettling. For many of the students at the institute, taking a high-paying job is a very big thing, for which most of us have slogged nights and days preparing for IIT-JEE. The slogging ensured that majority of us entered the prestigious institute eyeing on 'packages' and good paying jobs and not evolving into engineers and to develop technology. And many of us end up as being consultants, investment bankers, analysts and not the engineers as we have been trained for the four years in the institute. I am quite unsure this is my experience alone or the issue of the major part of student community. But one thing we all can say with surety that the education system in our country has failed us all.

It is being long felt that the youngsters entering the field of engineering education in India are not as facile and deft with objects and things of everyday life as their peers from the developed countries. It has emerged that a significant number of Indian youth are not sufficiently "hands-on", and this missing ingredient often slows down the pace of technology based innovation. In an endeavour towards bridging this gap Tinkerers' Lab has been established.

The recent initiative taken by alumni from the batch of '75, supported by the current IIT-B administration, called the Tinkerers' Lab, is a tiny move in the right direction. Tinkerers' Lab is a place where students can meet in groups, outside of the regular curriculum. It is situated besides TreeLabs near Mechanical Department at N3 Bay area. The workspace at Tinkerers' Lab is being equipped with tools and materials to allow students to break down and rebuild gadgets to learn how they work, or to build novel gadgets. To a large extent, our engineering education at IIT-B is being treated as a queue where once you enter you wait your turn to get out and start making big bucks by getting jobs with global consultancy firms, or joining MBA schools. Tinkerers' Lab is encouraging those who want to be different.

The lab was inaugurated on March 19, 2014 by Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India, in the presence of Prof. Devang Khakhar, Director, IIT Bombay, Prof. U.A. Yajnik, Dean, Students Affairs, IIT Bombay, Prof. Ravi Sinha, Dean, Alumni & Corporate Relations, IIT Bombay, among others. Speaking at the occasion, Dr. Chidambaram, said, "One of the aims of the Tinkerers' Lab is to empower students to take systems apart, examine the component parts and rebuilding back the original systems. It will also help the students to put together new systems, to convert creative ideas into actual engineering products." He moreover, suggested that Design innovation may be incorporated into the new technology development. "Design innovation can add exceptional value to product innovation and you have an excellent Industrial Design Centre at IIT Bombay. I hope the students using Tinkerers' Lab are able to derive benefit from the Design Centre as well," he added.

The Lab has been established with a generous funding received from the 1975 alumni batch of the Institute, who have pledged a sum of Rs 2 crore towards it. The '75 batch alumni

team will moreover, provide mentoring, run workshops and help organize lectures by famous innovators from India and abroad, for the benefit of IIT Bombay students. According to Mr. Hemant Kanakia, a 1975 batch alumnus of the Institute and a successful entrepreneur based in USA, "Our counterparts in US and Europe learn to build and tinker with systems from an early age. That gives them an edge when we compete with them in our professional lives. Innovators like Steve Jobs of Apple and Mark Zuckerberg of Facebook developed their innovative ideas while experimenting as students, whereas we at IIT usually learn how to excel within confined bounds of curriculum and examination system. I believe that to be relevant in technology game, IITs have to meet the challenge of how to motivate their students to build things, to take initiatives and to learn to innovate by building."

The Tinkerers' Lab is being set up with an intention of promoting experimentation, creativity and innovation, and will be equipped with latest workstations of electrical and mechanical tools including power mechanical machines like Lathe, Milling, Welding, Drilling, electronic test instruments, 3-D modelling software, Small PCB manufacturing unit, several workbenches, several single board computers such as Arduino boards, etc. It will moreover, allow students to borrow spare parts and electrical circuits from its store and would provide latest mechanical and electrical tools to build and to test electro-mechanical systems from small to big projects like robots,

flying machines, and biometric systems, to cite few examples.

The facility, which is managed by the students (Students' Technical Activities Body), is open to all students of the Institute, irrespective of their discipline, and is made accessible 24x7. It provides the freedom and facility to experiment, exercise imaginations and build novel systems. Students may begin by taking apart systems and learning how it works and by putting the knowledge they gain to build innovative advanced systems. "I hope this will aid us in generating a culture, where students work in the labs, do things on their own and also learn in the process," said, Prof. Khakhar.

Till now Tinkerers' Lab has helped in taking the institute's technical projects to a new level. A 24x7 open working space with all the latest equipments and machineries removed the infrastructural barrier. Below are listed few of the many projects accomplished/ongoing in Tinkerers' Lab:

1. Low cost CNC cutting and engraving machine
2. Fault testing and analysis of digital circuits
3. Refreshable Braille Display
4. Tilt Rotor
5. Ultrasonic Blind Vision device
6. Pole Climbing Robot
7. Self Balancing Robot
8. Drishti - Reading robot
9. A prototype for blood typing
10. Wall Climbing Robot
11. Skates
12. Traffic flow estimation using Infrared
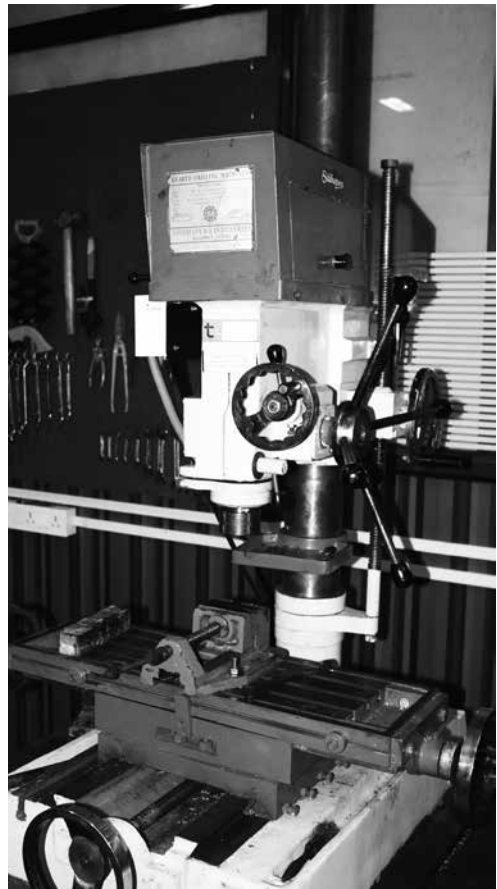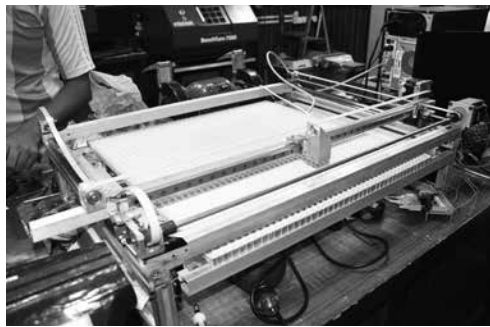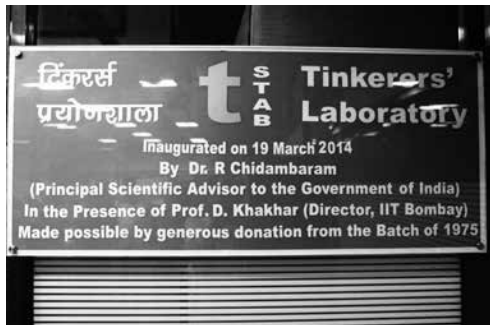
imaging

13. Guitar Making Device

14. Selective Laser Sintering Machine

Every year during summer STAB organizes Institute Technical Summer Projects (ITSP) for students to transform their own ideas into prototypes.

Thanks to Tinkerers' lab, students were able to maximize the outcomes with much consolidated efforts. The availability of each and every thing required to drive the project to completion under one roof , ranging from soldering iron to milling machine and from mentor support to inter-team interaction helped the teams a lot. 74 out of the 121 projects were completed and demonstrated

by freshmen during the summer. List of all registered projects can be found here: http://itsp.stab-iitb.org/projects.php

The facility is now the hub for tech-enthusiastic students to meet up and works on novel ideas.

Laser CNC cutting machine built in TL Major Events funded by Tinkerers' Lab are:

FireHack hardware hackathon
- 36-hour long hardware hackathon wherein participants worked on their submitted ideas to develop a prototype with a long-term aim to convert it into a product. These ideas were pitched to investors during the final presentation. There was

a turnout of 12 IIT teams and 2 non-IIT teams out of which 8 teams successfully demonstrated their work.

SSTeP (Solution to Socio-Technical Problems)

• A week-long event with an objective of identifying the existing problems on campus and getting people started with the implementation of possible technical solutions.

Major events where Tinkerers' Lab has been extensively used are:

XLR8 - Remote Controlled Car Racing Competition

Largest competition for freshmen witnessing participation of about 600 students. Tinkerers' Lab used by teams to make their bots and for debugging sessions. Teams used RF modules made by STAB managers in Tinkerers' Lab while in previous years, RF module was procured from market.

Line Follower Competition

• Second competition for freshmen, where freshmen are introduced to arduino and basic automation systems. Participation of 40 teams out of which 24 teams attempted the track and 11 teams completed.

Techify your Room

• Take-home projects which could be implemented in rooms. Participation of 6 teams with 6-8 people in each team out of which 5 teams completed.

We sincerely thank the alumni batch of '75 for taking a step towards improving the technical scene in the institute. We thank them not just for the funding but also for their constant support and encouragement. Without your guidance, this major step towards getting the next big innovation from India would never have become a reality.

Dewashish Kumar Dey

Dewashish Kumar Dey is a 3rd year undergraduate in Mechanical Engineering department at IIT Bombay. He has been a member of Students' Technical Activities' Body (STAB), IIT Bombay for the past two years and currently, the manager of Tinkerers' Lab and Technovation. Academically, he is interested in manufacturing processes, fluid dynamics and physics in general. He is extremely interested in the recent developments on the field of technology and also like reading about Indian history and politics.

Feelings

ANURA KENKRE

*P*art of the problem with the word 'disabilities' is that it immediately suggests an inability to see or hear or walk or do other things that many of us take for granted. But what of people who can't feel? Or talk about their feelings? Or manage their feelings in constructive ways? What of people who aren't able to form close and strong relationships? And people who cannot find fulfillment in their lives, or those who have lost hope, who live in disappointment and bitterness and find in life no joy, no love? These, it seems to me, are the real disabilities.

Fred Rogers, The World According to Mister Rogers: Important Things to Remember

'Feelings' are a strange term to describe. By the dictionary definition, it means the emotions experienced by a person. But these feelings vary from person to person, hence are a very tough thought to interpret. Some people are even able to fake these. Now-a-days some people may not have emotions. I mean this very seriously as I have managed to observe at least one case of each 'type'. Just yesterday a friend of mine was telling me about her father and the current situation in her house. Her father easily listens to the opinions of the people around him (family excluded), these people include colleagues and friends and falls prey to whatever they say. His thoughts control his body so much so that he even falls sick after listening to people around him. For example,

one of his friends told him, that since he feels tired while walking and was having pain in his left hand, he has a heart disease. He took this thought so seriously that he would continuously experience pain in the left hand exactly as his friend had mentioned. Their family kept reasoning with him that he had picked up lot of luggage with that arm the previous day and had also over-exercised and hence this was an after effect. However, he would not listen to the advice of his family. They had to take

> **"What people do not realize is that their actions have effects on other people's lives as well. We must never take people, especially our family and friends and their emotions towards us for granted!"**

⚜

him to the doctor, get a stress test done and an ECG had to be done in order to prove to him that he was perfectly fine! The physician taking his stress test even told him that he has the heart of a 40 year old even though he has crossed 60! The doctor added that these are just games that his mind is playing with him. After hearing from the doctor, the family was able to calm him down.

I felt sorry for her but tried my level best to console. We are all PhD students and she is a M.Tech. student, so she had to miss all her lectures and practical's for four days until this scene ended. What people do not realize is that their actions have effect on other people's lives as well. We must never take people, especially our family and friends and their emotions towards us for granted! I simply told her to tell her dad the following: *We were told this story when we were very small. There is a famous legend about people of a village who tethered their herd and then went to sleep at*

the end of a day. They kept a boy to guard the herd while they were away. The boy would get bored guarding the herd and thought of playing a prank. He yelled, "Fox has come, fox has come. "The entire village came running to stop the fox from attacking the herd. The boy had an amazing time laughing at the villagers. He managed to repeat this 2-3 more times and had some fun at the expense of the village folk. Then one fine day, a fox actually came and started attacking the herd. The boy yelled with all his might but this time no villager came to his help. The entire herd was eaten up by the fox and the villagers as well as the boy were left with nothing. I quoted this story to my friend whose father was suffering from the panic attack. I told her, if he keeps repeating this behaviour then one day when he actually needs help no one will even listen to him.

This incident apart, another friend narrated her story to me. She said that her parents are looking for prospective grooms for her. But there is a generation gap between her and her parents. Hence they look for grooms in accordance with what they have in mind and keep her preferences aside. There are continuous tussle at home due to this gap in expectations. She would say with tears earlier that she fears what the future holds for her.. Many more such stories. But I have noticed that very few of these stories have happy endings, reason being that people are falling short of "Feelings". They are concerned only for themselves and so long as they are happy who cares what the other is going through. Many of my friends continuously complain about their bosses, colleagues who backbite, and the increasing competition in their workplaces. On account of all this the levels of frustrations are on the rise. In order to get good jobs, we leave our homes and get 'settled' in other cities which offer the 'best packages' in the market and then get married to the ' most suitable groom/bride'. However, the truth is that there is nothing like being settled these days. Earlier being settled meant getting a job, starting a family, but these days it does not mean that any more. Simply getting a job is not enough; you need to have a good salary with your own house and many such things. Best packages do not have a meaning because they keep varying. The want for money never diminishes and is only on the rise with each promotion. And the last about a 'most suitablebride and grooms' the lesser said the better! No one seems to be happy with whatever they are doing. the Many young people are depressed, and annoyed.. Their stress levels are at an all time high, patience at an all time low! Sigh!. The sentiments; they are restricted to TV serials and if anyone tried to bring them in real life then the reaction which you have to face is, "Bore maat maar yar! Pakau!"

However, the truth of life lies hidden in this famous quote by Helen Keller:

"The best and most beautiful things in the world cannot be seen or even touched. They must be felt with the heart". ✳

Anura Kenkre

Anura Kenkre is a third Year Research Scholar in the Department of Educational Technology. Her masters is in Physics with a specialization in Electronics and Telecommunication. She has also worked as a Research Assistant at IITB for the project "OSCAR for Physics Higher Education" for a period of one year. Apart from this, she has worked as a reviewer for the International Conference on Technology for Education, 2012. Lastly, other than academic activities, her hobbies and participation in extra-curricular activities includes creative and technical writing, photography and music.

A Face that Launched a Thousand Handshakes

BAKUL DESAI

[Some IITians can be romantic. Emotions and poetry pour out of their pens like hot lava, though the flow is governed by equations learned in the Fluid Mechanics lab. A submission to Fundamatics by an alumnus was a nostalgic recount about a poem he had penned for the object of his desire way back in the early seventies. This led to a discussion within the Beehive about whether IITian males used to be that "despo". This in turn led to the recollection of a story that was printed n "Madhouse: True Stories of the inmates of H4, IITB", wich is reproduced here with the permission of the authors].

Perhaps it would have been better for us if they had not allowed any sort of vehicle in IIT – we managed to have mishaps even on bicycles. And I suppose, if they had banned all forms of transport, we would have bumped into each other while walking, some professors and some of us were lost in thought and lost track of our surroundings sometimes. But we did have long distances to travel, so some of us did get around on horses, and two wheelers both man powered and gas powered. And so, we did occasionally collide with one another. But that's never the whole story in IIT, and a collision is never just a collision.

In HSS 201(second year humanities logics course) we were taught a humanities course on logic which started with the usual:

All Sikhs are Punjabis,

> **It was after all I who had an accident with her and something told me that knocking down Vijjy in IIT was tantamount to committing suicide. There would be a lynch mob after me, I was sure of that.**

❧

All Punjabis are Indians.

Therefore, all Sikhs are Indians.

Maybe the logician did not know about Canadian Sikhs but that is an irrelevant detail. The ultra-logical IITian applies logic in his own inimitable way.

Vijjy was the reigning queen of IIT. She was pretty, smart and articulate. She was a talented badminton player and a sensational singer, and she was the Soc Sec of H10. Understandably, she set a thousand hearts aflutter, and was stalked by a few hundred suitors at any given time. One evening, Vijjy was cycling up the slope outside the Convo after a gruelling game of badminton. I was mobiking down the same slope after a gruelling beer guzzling session at RK. I saw that she was cycling in zigzags in order to beat the severity of the slope. I was going in a straight line, despite my recent activity. Just near the Convo entrance, Vijjy lost control and meandered straight into my path. My reflexes worked to

jam on my brakes fast enough. But my tires were balder than Prof. Kamath's pate and I slid right into her bike. As I dropped, I saw her fly backwards in slow motion and land on her head. I got up quickly though I had bruised my head and forearm, and saw that she had passed out. I was struggling to get her up on her feet, and scores of guys materialized from nowhere. Odd, I never saw such an enthusiastic mob during my other numerous accidents. They began to fight among themselves about who would hold what while carrying her to the hospi. Her mouth was bleeding and her head appeared to be injured too (I found out later that she had chipped her tooth, and she still carries this reminder with her). I yelled at the "perverts" and managed to get them focused on getting her to the hospi as quickly as they could.

Once there, the lone nurse Patil sister administered first aid as even more guys materialized from nowhere – they were now flocking to the hospi in hordes. Fortunately, someone had the sense to call her friends, and almost everyone from H 10 arrived there. I sat there holding my head and waiting for my turn to get fixed up when Vijjy started mumbling "main kaun hoon? Main kahan hoon?" It was temporary amnesia - very temporary - but long enough to scare me out of my wits. It was after all I who had an accident with her and something told me that knocking down Vijjy in IIT was tantamount to committing suicide. There would be a lynch mob after me, I was sure of that. I must have said something in my panic, because the girls quickly came over and comforted me. They assured me that the tetanus shot Patil sister was about to administer "won't hurt at all yaar! It's just like a mosquito bite." They supervised as Ms. Patil cut my hair, applied ointment to my injured scalp, and bandaged my forearm and foot.

Vijjy was taken to Rajawadi hospital in Ghatkopar - all serious cases beyond the capability of our hospi were diverted there. This made me even more panicky. Fortunately, the mob of angry young men disappeared as soon as Vijjy left, and only a few girls stayed to see that I was properly discharged.

Patil sister said, "see Bakul! All boys are coming and everyone is asking Vijaya how she is but nobody is asking you. Boys are very bad, no?" I concurred silently. She continued, "But I am not like them. I asked you first and I put bandages on you, no?" I mumbled something about her not being a boy, and I got a playful

> Patil sister said, "see Bakul! All boys are coming and everyone is asking Vijaya how she is but nobody is asking you. Boys are very bad, no?" I concurred silently. She continued, "But I am not like them. I asked you first and I put bandages on you, no?"

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pinch on my cheek and a "you're a naughty boy!"

Shashank, Vijay and Birjoo came to the hospi on Shashank's Bullet. I couldn't kick-start my mauled bike with my injured foot, so they did it for me. News of the accident had reached H4, of course, and I was overjoyed to see a huge reception committee at the entrance when we got there. I felt loved and cared for. I hadn't even gotten off my mobike when a mob of guys surrounded me. They asked me what she was wearing, how she fell, whether I carried her to the hospi alone, where she was hurt, where she was now, what happened to her cycle, whether I got to see any privileged sites, and so on and so on. Someone had handed me Vijjy's case of shuttlecocks at some point, and one of my numerous interlocutors grabbed it and inspected every last shuttle cock. He then gave it back to me and

asked if I would be going to Vijjy to return her case and wondered if he could come with me, as my friend.

Vijjy returned from Rajawadi the next day. Her face was bloated and badly bruised. Her Dad came for her, to take her home to Baroda. Before Vijjy left, I went to see her. Manjunath Pai chauffeured me there on his cycle, my aching foot wouldn't even let me walk without a limp, leave alone start a mobike. Vijjy greeted me with a handshake and said that she was

This gesture touched me. I quickly agreed that it was her fault and told her not to worry. She was welcome to get knocked down as often as she liked and I wouldn't feel agonized at all, I said.

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sorry, and that it was her fault, and that she felt bad about putting me through so much agony. This gesture touched me. I quickly agreed that it was her fault and told her not to worry. She was welcome to get knocked down as often as she liked and I wouldn't feel agonized at all, I said. The girls in her room went into paroxysms of laughter and I realized what I had said. I scurried out quickly while muttering my next blooper, "see you next accident."

Back at the hostel, there was another mammoth reception committee awaiting me. News had spread that She shook my hand. How? Pai was with me the whole time and had not stopped anywhere to make a call. There were some friends of Vijjy's from H1 in her room, but they didn't look like the types who could spread this news beyond their own wing. Anyway, this time, my hand was almost pulled out of my body. Every guy vigorously shook my hand. A few attempted to take that hand toward their face and neck, at which point I reclaimed it in disgust. They thought

of a new method. They shook my hand and then applied the molecules of that second-order handshake to their faces, lips, neck and wherever else they thought they needed to. For the first time, I felt I might have been better off in Vijjy's shoes - her head injury seemed preferable to this mental torture from these logicians. Their logic -

A girl shook hands with Bakul
Bakul shook hands with me.
Therefore, the girl shook hands with me. ✳

Bakul Desai
CHEM.ENGG., 1982, H4

Bakul Desai was infamous in his student years for many things. He is famous in the alumni community for many other achievements. What has not changed in all these years is his love for "faat-ing". Similar examples of his unique brand of nonsense can be found in his bestselling book "H4 Madhouse: True Stories from the inmates of hostel 4".

Road to Inter IIT 2014

INSIGHT TEAM

The Mecca of Sports for every sportsperson at the IITs, the Inter IIT Sports Meet is the biggest inter-collegiate tournament in the country in sheer scale. It is an eight-day long affair held in December every year, where students from all 16 IITs battle it out for the coveted General Championship Trophy. All the able IITs take turns hosting the meet.

The 50th Inter IIT Sports Meet is to be held in three phases - the Aquatics Meet from 30th September to 4th October, the main Students Meet from 12th to 19th December and the Staff Meet from 22nd to 26th December, and IIT Bombay is all set for hosting the grand event. With work for the Golden Jubilee in full swing, we bring to you updates on all the work that has already gone into preparing for the meet, and details about everything planned here on.

The Hosting Committee

The Inter IIT 2014 organizing body has a very well defined administrative structure. The Organising committee is headed by the Director, and there are a number of faculty members involved in the hierarchy- at the bottom of which is the Inter IIT student team. There are 3 Overall Coordinators, two handling sports, and one handling the administrative aspect of the event. The General Secretary of Sports Affairs acts as the main link between these OCs and the authorities. The team has further been divided into specific departments

> **"Given that hosting the InterIIT is a huge honour for any IIT, there is influence from the Main Building in all major decisions regarding the events, thus limiting the extent of freedom enjoyed by the student organizers".**

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- with each department being assigned its own Managers (who are chiefly responsiblefor execution) and Faculty Advisors.

Execution

Given that hosting the Inter IIT is a huge honour for any IIT, there is influence from the Main Building in all major decisions regarding the events, thus limiting the extent of freedom enjoyed by the student organizers.Unlike other institute bodies like MI, TF and E-Cell, the students have strictly recommendatory powers and the final approval for decisions comes through the FacAds. The Inter IIT team was selected after a rigorous interview process, much like any other IB, and consists of students who have shown considerable leadership traits elsewhere.

Now that the Inter IIT Meet itself is at hand, the team will face a unique predicament in being able to attract volunteers for the event, given that there is no incentive that they can offer those that are involved with the

event this year, in contrast to the clear, demarcated raise in hierarchy that other IBs promise volunteers in exchange for their efforts. It is thus that the team plans to capitalize on the "Sports-senti" factor that pervades a significant subsection of the student populace.

Events

A Board Meet, co-chaired by the Director and the Dean of Student Affairs, was conducted by IIT Bombay in the first week of August in which two Sports Officers and the Gen-

> "For IIT Bombay, this Inter IIT Sports meet is more than just a sports competition. It is that one event in which other IITs will challenge the prestige of our Institute and where we fend them off with the clichéd blood, sweat and tears".

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eral Secretary of Sports from all the 16 IITs reviewed the rules and number of events to be conducted at the Sports Meet. This semester has also seen regular informal events such as screening of movies and matches being conducted by the Inter IIT team at regular intervals. The Sports Mela was held on 29th August to celebrate the National Sports Day. Also, the first-ever contingent meet was organized successfully with inspiring talks from sports officers and the Dean SA. The special person of honour Dr.Madhavan, a retired professor of IIT-Bombay, who was also a member of the first ever IIT Bombay Basketball team in 1961, reminisced about his experiences to motivate the IITB contingent.

Food, Travel & Accommodation

Accommodation is indeed one of the biggest challenges faced by the Institute for hosting the event. With 16 IITs participating (each with an upper cap of 162 students),

the total space required is nearly equivalent to that taken up by 1st, 2nd and 3rd year UG populations on campus combined. While girls are expected to be given accommodation in apartments within the campus, NITIE and MTNL guesthouses will be used for accommodating the male population in addition to Hostels 15and 16.

Food is another major issue since the Student Meet followedby the Staff Meet will last for approximately two weeks during which a centralized mess will have to cater to such a large population. Even now, for team practices during the semester, it has been proposed that the messing time and place be shifted to a common mess with extended mess timings at no extra cost, since practices often clash with the usual dinner timings.

Sports Infrastructure

This year will see a number newly constructed sports facilities being utilized for hosting the events. A two storied building measuring 55,000 sq. ft area in front of H11 will house three Squash courts and a Table Tennis hall on the ground floor, three Badminton courts on the first floor, a full-fledged Gymnasium, a viewing galleryand a pavilion on the second floor. The SAC phase 2 being built opposite H3, measuring 42,000 sq. ft., will boast of three Volleyball courts, two Basketball courts and three indoor Cricket pitches. Apart from the construction of these new structures, almost the entire existing sports infrastructure will be renovated. The Gymkhana Grounds have been revamped, to provide a better playing surface for athletics and field sports like Football, Hockey and Cricket. The old tennis and basketball courts will be replaced by new surface and the surface of the badminton courts will be replaced by new, imported mats. The lights of tennis courts, football field, basketball courts and badminton courts will also be replaced. On a side note, there is no truth behind the rumours of a cricket stadium being built behind H13.

structural facilities for all sports enriching the institute's infrastructure and ensuring a better experience for all in the institute. Insight wishes the contingent all the best and looks forward to covering some winning numbers! ✳

insight
the third eye

Insight Team

© Utkarsh Raut, 5th year Mechanical Engineering Dual Degree student.

Let the Games Begin

The first phase of the sports meet – Aquatics, was conducted from 1st to 4th October. The opening ceremony for the event was held on 30th September, with Indian swimmer Virdhawal Khade, an Olympics and Asian Games champion as its chief guest. This was followed by water polo, 6 swimming events for men and 5 swimming events for women. Several records were broken over the 4 day period which eventually saw IIT Roorkee and Madras emerged as swimming champions in the Women's and Men's category respectively.

For IIT Bombay, this Inter IIT Sports meet is more than just a sports competition. It is that one event in which other IITs will challenge the prestige of our Institute, and where we fend them off with the clichéd blood, sweat and tears. As the Inter IIT wave passes, we shall have international standard infra-

Leadership through Relevance

HEMANT JAIN

Satya Nadella asked Steve Ballmer in a management performance review how he stacked up against "greats" from Microsoft Corp.'s past. The chief executive called the question "nonsense", because it didn't focus on the future of the company. That moment transformed Mr. Nadella's thinking. "What drives me every morning and what keeps me up every night is one thing: this business is not about longevity, it's about relevance," Mr. Nadella said.

So, how do we and our companies stay relevant in this ever-changing world?

When I graduated from IIT in 1982, the buzzwords then were 'business data processing', 'RDBMS' and a few other technologies. Those who joined the bandwagon and stayed in those technologies have been left behind. Those who kept up with the changes through the times are relevant and well-known in their fields.

Here are a few lessons I personally learnt in the industry:

Don't hurry to get a title unless you are ready for it

In my career, I have seen too many youngsters too eager to get a title, especially a managerial one. It may help them find a better bride or let them feel more accomplished in the family, but it doesn't help them in longer term. That's truer if they are not ready.

Stay technical, if that's what you like

> **You are an IITian! Don't be ashamed to remain technical if that's what you like. There are technical ladders available these days in large organizations. Some new technologies are not easy to learn, but the brain needs to be sharpened regularly. If you don't use it, you lose it.**

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You are an IITian! Don't be ashamed to remain technical if that's what you like. There are technical ladders available these days in large organizations. Some new technologies are not easy to learn, but the brain needs to be sharpened regularly. If you don't use it, you lose it.

Even as an entrepreneur, you can find others who can look after your business while you look after the technical aspects, because that's what you excel in.

Choose business roles only if you are good at them

Some people have the knack for business and management. If you are one of them, go for it. But do introspect a little before choosing that path. And stay relevant there too, by staying abreast of the changes around you. Business and technology are not separate

islands- there is so much that links the two. When you specialize in a technology, understand the business drivers.

Look for integration opportunities in the areas that you know and the upcoming areas that you need to learn

Technology usually changes gradually with a few disruptions. You may find that your accumulated knowledge in one area can be combined with a new emerging technology. There won't be anyone better than you in this integrated technology. Look for such opportunities.

Staying technical is a continuous process

What you learn in IIT will only take you so far. What IIT gives you is the ability to learn new skills quickly. Utilize that to stay abreast. The Internet is a great equalizer, you have access to knowledge in any field that you like, wherever you are. If nothing, join online courses whether you are just out of IIT or close to retirement.

You can't do it on your own, but nobody will do it for you either

No one can succeed alone. You need a network. You need to consciously build that network. You need people around you who will guide you, mentor you or simply be there for any advice that you need. But remember that eventually, you need to take the lead. They won't do it for you. Look for role models as you grow so that you can stay relevant. You can love and respect your high school teacher, but to stay relevant in technology for big data for self-driving cars, maybe you need another mentor.

Network with the younger lot

If you are mid-career, continue to stay in touch with younger alumni. They will energize you and tell you what's new. Train interns in your job- there is a lot to learn in coaching.

That's one thing I personally like about the medical profession – they formally teach the next generation.

In summary, do not make yourself obsolete. To be successful, continue developing yourself. Keep innovating and re-inventing yourself and stay connected. *

Hemant Jain
M.TECH, 1982, EE, H1

Hemant Jain is VP of Engineering at Fortinet and is the vice president of Pan-IIT Bay Area chapter. Hemant has led large and highly successful product development teams in Tata Consultancy Services and Oracle Financial Services Software Limited in India and has 7 patents and 3 pending patents in the Internet security space. He is now actively involved in planning for the Pan-IIT Bay Area chapter 2015 event.

Little Miss Polly Nomial: A Mathematical Fable

(A classic, first published in The Best of The Journal of Irreproducible Results, where it is described as "submitted by Richard A. Gibbs", with no claim to authorship.)

S.MURALIDHARAN

Once upon a time $(1/t)$, pretty little Polly Nomial was strolling across a field of vectors when she came to the edge of a singularly large matrix.

Now Polly was convergent and her mother had made it an absolute condition that she must never enter such an array without her brackets on. Polly, however, who had changed her variables that morning and was feeling particularly badly behaved, ignored this condition on the grounds that it was insufficient, and made her way in amongst the complex elements.

Rows and columns enveloped her on all sides. Tangents approached her surface. She became tensor and tensor. Suddenly two branches of a hyperbola touched her at a single point. She oscillated violently, lost all sense of direction, and went completely divergent. As she reached a turning point she tripped over a square root that was protruding from the *erf*, and she plunged headlong down a steep gradient. When she was differentiated once more, she found herself, apparently alone, in a non-Euclidean space.

She was being watched, however. That smooth operator, Curly Pi, was lurking inner product. As he numerically analysed her, his eyes devoured her curvilinear coordinates, and a singular expression crossed his face. Was she still convergent, he wondered? He decided to integrate improperly at once.

Hearing a common fraction behind her,

> **Hearing a common fraction behind her, Polly rotated and saw Curly approaching her with his power series expanding. She could see by his degenerate conic that he was up to no good.**

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Polly rotated and saw Curly approaching her with his power series expanding. She could see by his degenerate conic that he was up to no good.

"What a symmetric little polynomial you are," he said. "I can see that your angles have lots of secs."

"Oh sir," she protested, "keep away from me. I haven't got my brackets on."

"Calm yourself, my dear", said our suave operator. "Your fears are purely imaginary."

"I, i," she thought. "Perhaps he's homogeneous."

"What order are you?" the brute demanded.

"Seventeen," replied Polly.

"I suppose you've never been operated on?"

"Of course not," Polly cried indignantly. "I'm absolutely convergent."

"Come, come," said Curly. "Let's go off to a decimal place, and I'll take you to the limit!"

"Never!" gasped Polly.

"Abscissa!" he swore, using the vilest oath he knew. His patience was gone. Coshing her over the head with a log until she was powerless, Curly removed her discontinuities. He stared at her significant places and began smoothing her points of inflection. Poor Polly. She felt his hand tending to her asymptotic limit. Her convergence would soon be gone forever.

There was no mercy, for Curly was a heavyside operator. Curly's radius squared

Come, come," said Curly. "Let's go off to a decimal place, and I'll take you to the limit

itself. Polly's loci quivered. He integrated by parts. He integrated by partial fractions. After he cofactored, he performed Runge-Kutta on her. The complex beast even went all the way around and did a contour integration. Curly went on operating until he satisfied her hypothesis, then he exponentiated and became completely orthogonal.

When Polly got home that night her mother noticed that she was no longer piecewise continuous, but had been truncated in several places. As the months went by, Polly's denominator increased monotonically. Finally she went to l'Hospital and generated a small but pathological function which left little surds all over the place and drove Polly to deviation.

The moral of the story is, "If you want to keep your expressions convergent, never allow them a single degree of freedom." ✳

S Muralidharan
M.SC. PHYSICS'72

S Muralidharan, the self-styled "Cool Cat" of H9, joined the Banking Industry in '72 and went on to found India's biggest private Life Insurance Company in 2001. Heretired in 2011 and lives in Chennai. A jazz fan, he never missed a Mumtaz movie at the Convo, sometimes watching both shows.

The Pendant

VIPIN KUMAR

Like so many of us, he too suffered from bad times. Like so many mothers, his mother showed his kundli to the *pandits*. They all said that he is suffering from bad '*Grih*'. And to appease those foul mood *Grih*, he needs to do some rituals and wear some stones. He ignored all such advice from the pandits and focused on the real world efforts, namely applying probability theory. The more you try, the more you increase your chances of success. He never believed that his luck would change if he threw 5 coconuts in a pond which was located to the west of his home. Or he should go the Shiva temple every Monday, for seven Mondays, and offer milk to Lord Shiva. Or worse, wear a 51,000 pendant to ward off evil Rahu / Ketu. What he believed since he was a foot tall was that it was his parents' blessings and brothers' love that will make his luck and guide him in the world. For him, the God, the almighty, the supreme power, is simply Love. His love for his parents guides him do the right things for everybody around him. His love for his brothers gives him so much confidence in whatever he chose to do. His love for his country gives him the courage to raise his voice against any ill doings. His love for books guides him in the dark times. His love of puzzles, programming, and finance made him decently successful. For him, it has always been love, it will always be love.

He remembered the time when his father said "Don't worry about the 51,000 Rs. We

> **"What he believed since he was a foot tall was that it was his parents' blessings and brothers' love that will make his luck and guide him in the world"**
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will pay it in two or three months." He was angry and frustrated that his father, his hero, his guide, was asking him to believe in these things and spend his hard earned money on this. He calmed himself down and showed him that red thread around his wrist.

"Papa, Ma has tied this RakshaSutra around my wrist when I left home to study at IIT. She changes it each time when I come home. She picks up my wrist, cuts the thread and ties the thread ever so lovingly. You know, when she holds my hand for 10 seconds while she murmurs her prayers, I look at her. I look at the devotion of a mother, my mother. It reminds me all the times when she kept fast to wish for my good health . It reminds me how she would beat me with broom stick only to cry and hug me moments later. It reminds me of her uncountable kisses of love. Her undying devotion for her son's bright future. I remember all that. And honestly, I don't care if the universe is conspiring ill fate against me or all the *Grihs* are out there to get me. All I care about is this little red thread around my wrist. She is my goddess and I need just her

blessings and no one else's."

His father had no words to say. He only smiled with teary eyes.

"And besides, papa, you were a small town farmer and now look at you. You own a big house in a metro city, a flourishing business, and have well-educated sons and daughter-in-laws. You have the cutest and loveliest grand-sons and grand-daughters. Tell me it was all because you wore some pendant and I will believe in all this. It was your hard work. Your ability to stand tall against everything that came for our family. It was your karma. It was your love for us. I learnt it all from you Papa. I have always learnt it from you."

He rose from his seat and gave me hug. A hug which was simply his way of saying "I raised you well! You will do well in this world, long after I am gone." ✳

Vipin Kumar
B.TECH. ENGG PHYSICS,'06, H4

Vipin Kumar is working as a finance professional. His hobbies are writing and playing table tennis. He has also published a book called 'The Bluest Marble'. The book deals with the failures of a middle class boy who has came to Mumbai for work. It's the story of his failures and redemption.

Values are the Fuel of Excellence

VIRENDRA DAFANE

Every day, every one of us meets life situations that call for thought, decision-making, and action. Everything we do, every decision we make, and course of action we take, is based on our consciously or unconsciously held beliefs and values. We know focus, so now, what are values? Why do they shape our behaviours and influence our every decision in the long-term?

The Bhagavad Gita Perspective

The Bhagavad Gita says that human beings should practice three fundamental core values: Satchitanand -- 1) Sat means living a life with honesty and carrying truth everywhere; 2) Chit means living a life to gain knowledge; and 3) Anand means living life happily. Krishna said that only these three values are necessary to live a complete life. Practising these three values will give you complete happiness and fulfillment, requiring nothing else to live a happy life.

For example: Gandhi followed The Bhagavad Gita and only carried these three values, apart from patriotic values he had for nation and self. He lived with truth and always tried to gain knowledge. He never tried to accumulate any wealth or accommodate other materialistic values.

Modern-Day Values

Values are the basis for ethical or moral actions we take to reach our goals and live a good life. Values are emotional states that, based on our life experience, we believe are the most important for us to experience. There are two types of values: Means values and Ends values. Emotions like love, happiness, success, security, and adventure are described as Ends values. Means values are simply vehicles or instruments to achieve the ultimate outcomes. Means values are behaviors to achieve the Ends values. The ultimate goal of life is to know what you're really after: your Ends values. First thing to consider with values is, *Value Yourself*. Let's see what this means.

Value Yourself First

Valuing yourself has two potential elements: First is self-acceptance and the other is self-love. Let's see what self-acceptance is. You have feelings about yourself physically, intellectually, socially, and emotionally. You have an opinion about your abilities in music, athletics, art, writing, and so on. You may fail or you may not like your behavior sometimes, but that has nothing to do with your self-value. Everyone makes mistakes, everyone fails, but that doesn't reduce his/her value at all. So accept yourself all the time, and believe in your ability to achieve greatness ethically. Thus you will achieve self-acceptance.

Self-love means you love yourself; it doesn't demand the love of others. There is no need to convince others. An internal acceptance is sufficient. It has nothing to do with the viewpoints of others. You need to feel inside your mind that you are valuable. Complaining about yourself is a useless activity. If you don't

like something about you and your behaviour or your weight, take action and change whatever it is. Value lies in your own mind and your own conscious thoughts. Once you value yourself, let's examine what the various values are and how to identify them.

Value Identification

Now that you understand the importance of values, it's time to identify your own values— a process that could be one of the most important actions you have ever taken. To identify your own values, the best way is to question yourself honestly. Let's see what they are, shall we?

1. What do you love the most? This will bring your core love interests to light. People or activities?
2. Where are you most reliable, disciplined, and focused? Look for activities that you do without anyone telling you. These activities are your real passions.
3. What is your innermost dominant thought? I'm not talking about fantasies. These are your subjects and positive and negative thoughts.
4. What do you visualise and realise? This will determine your attitude towards life and your values for growth.
5. What is your internal dialogue? This conveys your strength value and how much you accept yourself. Even your weakness can be converted to strength.
6. What inspires you? This will articulate whether you value people or outcome or action, and what inspires you most out of the three.

What are your goals? Goals will bring clarity about your thinking and your Ends values. The moment you answer these questions is the moment you will start understanding what matters to you most. Your values are your core choice. Nobody else on this earth can determine your values.

Values and Relationships

An ignorant relationship is one in which you impose your own highest values onto the other person, judging them by your highest values and not considering or honouring *their* highest values. And whenever there is conflict, you are certain that their values are simply wrong and ignore them. This results in hurt and betrayal.

A submissive relationship is when you think in terms of the other person's highest

> **An ignorant relationship is one in which you impose your own highest values onto the other person, judging them by your highest values and not considering or honuoring their highest values.**

values without considering your own. In this case, you are overly concerned that the other person's highest values be supported, even as you minimise or disregard your own. You're just trying to stay out of trouble and keep the peace, which is not an effective way to achieve a healthy relationship. And when it comes to couples, that doesn't help to achieve true intimacy or love.

The third type of relationship is a compassionate relationship, in which you communicate your highest values and respect the other person's values, and vice versa. Each of you thinks about both yourself and the other, expressing both your love and respect for each other and each other's values. This is the most healthy type of relationship, and this has long-term success.

Values and Memory

Your highest values determine what you notice, what you remember, and what you intend or act upon. For the things we do value highly, we have what I call *default attention*

going on, which does a fabulous job of filtering your perceptions. Your highest values will lead you to notice things that another person might miss—even if you tried to point it out. You will remember and observe things that you think are valuable.

Two weeks back, when I met school friends in a get-together, one of them spoke about the fun we had, another spoke about commitment we showed to win school games, and yet another spoke about intelligence.

> **Your highest values will lead you to notice things that another person might miss— even if you tried to point it out. You will remember and observe things that you think are valuable.**

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Three different people speaking about three different values close to them: fun, commitment, and intelligence. Each one of them remembered what they valued most.

True and Shared Values

Time, once spent, cannot be re-acquired as, say, money could. Once spent, time stays spent. It needs to be treated with great respect and consideration given its true value. Truth is another true value, as once something happens, you cannot change it. Truth remains forever. Unless you respect true values, you cannot grow.

In a family, group of friends, or in an organisation, nothing makes an impact unless people have shared values. People with the same values connect amazingly, as the process to achieve goals is driven by shared values.

Values and Behavior

Your behavior is the product of your priority values. It has two types: behavior towards value and behavior away from values. The moment you behave with honesty and con-

tribution, it is behavior towards values. The moment you think selfishly and even get angry, it is behavior away from them. Everything can be achieved by practice. Practice behavior towards your primary values. When people turn away from values, it generates rejection, frustration, and loneliness. Stay with values, as it will bring peace, happiness, and growth.

Your behavior is shaped based on your understanding of values. How you understand love will define your behavior towards love. Many people want to stay in love, but later realise in life that they actually want to receive love and not give love. Nothing is more meaningful unless you understand the value of giving love and adding value to another life. Contribution is the only lesson that needs to be followed every day.

Secret of the Universe

The biggest secret of this universe lies in realising that your value is within your mind, your thoughts, and beliefs. Everything (positive or negative) that the external world declares is temporary, that is, time-bound. You don't need to give too much value to it.

"Your permanent value is within your thoughts, ability to act, and pursue a goal."

One of the greatest examples of perceived value was exemplified by Abraham Lincoln. From 1816, he lost almost every battle till 1860. That's about 44 Years! He finally became US president in 1860. He believed in his mind that he could lead the nation. He valued himself as president and did not lose heart due to continual failures and challenges for 44 years!

So live with values and believe that it is within your thoughts and ability to act.

Summary and Action Plan to Live True Values

1. Believe in your mind that The Bhagavad Gita Teachings are for the modern world. There are three 3 simple values necessary to live a complete life. And remember, start valuing yourself first.

2. Identify your values by asking the important questions stated prior. Those should give you your value list, hence the understanding as to which value you need to develop.

3. Observe your relationships and see whether they are compassionate or any other type. Improve, if required.

4. Observe your behavior and memory. Are you storing valuable things? Is your behavior towards values or away from them?

5. Identify if you are caring for *true* values. Do you care for time? Do you speak the truth and live truthfully? If not, you are living a life which lacks true value. Improve it and be valuable all the time.

6. The final truth is that your value is in your mind and your own ability to think and act. So pursue your highest value.

After you demonstrate a behavior with belief and right values, it definitely creates a great first step but what next? Can we sustain the same behavior over a longer time-frame? Yes, you can! If you have a skill named concentration with you! ✳

Virendra Dafane
M.TECH '05 ENERGY SYS,H1

Virendra Dafane is M. Tech. in Energy systems from IITB. He lives in Pune with his wife Kanchan and Daughter Sharvari. He is an author of a motivational book named " Thoughts of Excellence" available on amazon.com. He is passionate about leadership and behavior science and thinking aspects of human mind. Apart from self-help he writes Movie reviews and has an interest in analyzing Industry Trends. He currently works in Information technology sector. Feel free to write to him about your views about his writings on virendra.dafane@gmail.com

Of Pirouettes, Pivots and 25 U-turns

RAMESH NATARAJAN

1989. The newspapers were all abuzz with the June Fourth incident in Tiananmen Square in Beijing. And they were all strewn around me.

It was a long day at the office in Nariman Point. The noisy fan and the smell of newspapers were killing me. All that I had been doing was collating stories on college games, proof-reading score-sheets and schedules.

Only three days into what would have been my first job —well, 3 too many. Suddenly it was all too obvious. Sports is only my hobby even if it was my passion and love. Rewind a week, I had stormed into the Sports Editor Rajan Bala's office and convinced him that I wanted to join Indian Express as an intern journalist, much to his amazement and amusement. It was good old days that you could walk into an editorial office and get a job. Or maybe not when I read the stories of placement offers in campus these days.

Was not the best decision of my life, but I am sure if I had not done it then, I would have regretted not trying. I rushed towards it but walked away, just in time. I wonder when they noticed. A week later I was on a train to Calcutta to take up my first *real* job.

It was only 12 weeks earlier that I had enrolled for cricket umpire exams. Probably topped the exams only to realise that it was going to take me years and many seasons under the hot sun to get anywhere close to test cricket. And that is where that story had ended.

But what had just begun was my life of lovely twists and turns – always moving forward yet abruptly stopping and changing course often. I thought I emerged from IIT confused, yet something magical had happened that I did not notice. More recently I am able to *connect the dots looking backward* and some of it is beginning to make sense.

From designing & building a CNC flame cutting machine to become a welding electrode specialist. From a consumer electronics marketer to selling contact lenses, from leading an advertising agency to setting up a road express transportation service from Singapore to China. It has been a fascinating journey of life, of many changes through more than 2 dozen hats.

And here I was at one more of the crossroads about 18 months back that I decided *now or never* to be an entrepreneur, to uproot myself from the good life of a global corporate executive. It had not been difficult to quit, even a reasonably fetching corporate career at that. Confess between four walls, I was simply too bored after a decade in the same business and needed some new excitement.

To be called *entrepreneurial* in the comfortable confines of a large enterprise is like playing under arm tennis ball cricket in the nets. It is a whole new ball game when you give up your old calling card to one of your own. "A startup's default state is failure. As a founder, you have to work to unfail it".

Borrowed words, but this has been my painful yet pleasurable discovery as I cut through the grind of being an entrepreneur.

It was 29 years ago, but I will never forget the first day at IIT Bombay. About 150 people in the classroom and I could hardly see the professor at the end of the room. And our first computer class was in the convocation hall, if my memory serves me right. I think it was all an elaborate ploy to teach us that if you want to learn, it is all up to you. No one else can

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teach you. One learns oneself. So much like life itself. It is all up to us and our own devices. It took me 4 years and plenty of poor grades to understand this. I had doubted my love for learning. Maybe not Kreyzsig or Timshenko but I loved learning all the same.

There was something exceptional about the campus, my friends and the academic system that did not demand that I attend lectures. Except that I did not realise it then. But the learning has helped me be on the curiosity road for life. Simply enjoy the joy of learning every day.

I am on a new start now. Now it's all about mobile apps, social media, education technology – a curious babe in the woods, plenty to learn as I move forward. It has been 18 months now. I acquired a small tech company and setup a couple of businesses. Thought I will make an impact on the world of voice of cus-

tomer and learning methodologies in 3 years. I don't think either Pearson or Survey Monkey have noticed us yet. Give it some more time – else sell, close or pivot again.

Curiosity. Optimism. Enthusiasm. Passion. Hunger. Aggression. Competitiveness. Confidence. I think I acquired them all in fair measure when I turned from being a boy to a man. I can scarcely say with honesty it was all from the hallowed portals of IIT. Although staring at the notice board with everyone's marks and grades listed was a lesson in character-building. Like being given out unfairly by the umpire in a cricket match and having to walk back with grace. So much wisdom that the overall environment had given me. More accurately, all sitting in and around Hostel 2.

Proud as I now walk into every room as if I belong. With the confidence of knowledge that I learnt just hanging around there. As they say, there is no real ending. It's just the place where you stop the story. Rest of my journey begins now. But the theme remains the same. ✳

Ramesh Natarajan
B.TECH, C'89, ME, H2

Ramesh Natarajan is the founder-CEO of Curiosity Road and Nautilus Software, startups in the areas of mobile learning & Voice of customer/voice of employee technologies. A new entrepreneur after 21 years of successful corporate career across varied organisations in logistics, advertising, healthcare, consumer electronics & industrial in India and other Asia Pacific markets. He is proud of his very large collection of books and single malt whiskies. A failed marathoner, struggling golfer and attributes both to his love for good food.

Everyday Nature of Justice
Through the Lens of a Corn Vendor in the IITB Campus

ABHAY SINGH KANWAR

As Indian Institute of Technology, Bombay is one of the elite academic brands of the country, so to be a part of it in any proximity for millions in the country is no less than a dream come true. Given the intellectual stature of the institute, it is fairly obvious that students, research scholars and learned faculty form the major chunk of those millions. But the significant point which seeks attention and became one of the crucial rationales behind this writing is an interview with a corn vendor in the campus who, surprisingly, was also one of those millions who strived to be a part of IITB, at least in the minimal proximity.

As we move from the electrical maintenance division building at T-point to hostel one, on the left hand side, near the third streetlight, under the tree, one can find a corn vendor. Since these vendors come under informal and unskilled labor, injustice permeates in the everydayness of their life. Hence, I tried to peep into his life and gauge one of the premier academic institutes from his view point by personally interviewing him.

Rajkumar is an unlicensed corn vendor who used to put up his stall outside the main gate of IITB before entering the institute. Troubled by the local goons and harassed by the policemen outside the campus premises, he made up his mind to put up his stall in the premises of the institute. He failed to do so, given the unaffordable and stern financial requirements in the tender for opening up an eatery in the campus. After getting in touch with one of his close associates in the campus, he was able to join the institute as a corn vendor on April 1, 2013. In the beginning, he was permitted to sell corn in the campus for three months on the humanitarian grounds; hence the institute did not charge him a monthly rent. Taking cognizance of his deprived socioeconomic condition, his permit was continued. But when gymkhana elections took place in March 2014 and new general secretary for hostel affairs joined in, his permit was discontinued for two months due to procedural complications with reference to the policies regarding tender and contract renewal. When he ran from pillar to post in the administrative corridors of the institute to save his livelihood, his permit was renewed. It therefore was a bolt from the blue for him when he received a notice from the Estate office of IITB in the month of November 2014 which declared that he mandatorily has to pay a monthly rent of INR 1200 for the space of 4*4 feet beside the footpath under the tree which he was using for putting up his corn stall. To add to his distress, the notice issued to him was applicable from the month of August 2014, which meant that apart from paying the monthly rent for the month of November, he mandatorily had to pay an amount of INR 3600 for the last three months of August, September and October in one-go.

With reference to the products in his stall, he is just permitted to sell two products of corn: roasted corn and boiled corn, which he sells at INR 20 and INR 25 respectively. His absolute profit after selling roasted corn is INR 3, and INR 5 for each unit of boiled corn. Though he has repeatedly urged the administration to allow him to also sell coconut water which could facilitate him in extra earning, his repeated requests to sell coconut water have proved to be ineffective. On being asked about his family, he apprised that he stays in a 6*16 feet room which cost him approximately INR 60,000, out of which INR 50,000 was spent for purchasing the space for room and 10,000 for buying construction material, He is the only bread winner for his family and has seven mouths to feed, with an unemployed wife and six children, which includes five school going daughters and one son who is about to join school.

Now the question arises- what is at stake and where do we go from here? On one hand institute strictly adheres to the principles of quantitatiive economics and legitimate rules when it comes to outsourcing certain services of the campus to ensure not only the security and welfare of the students but also guarantee the credibility of the bidding entities that provide their services in the campus. On the other hand, adhering to same stringent framework supplants the very ethos of the humanitarian principles which could have facilitated a corn vendor in making his living. Analysing this case, one can primarily figure out four stakeholders: students of the campus, legal bidding entities as per the rules of the institute, I.I.T.B. administration and a corn vendor. Each stakeholder, irrespective of her or his socioeconomic orientation, ideally should have an equal access to justice. Given the complexity of the debate due to diverse socioeconomic orientation of the stakeholders, the very idea and access to justice to even one stakeholder would be a tradeoff with other three stakeholders.

Detailing it further, IITB administration has to mediate between the principle of price regulation to facilitate pro-student facilities on one hand and basic principles of market, which can minimally support the legal bidding entities in the market, on the other.

As mentioned above, Rajkumar was permitted to sell corn on humanitarian grounds even when he was unlicensed,without needing to pay any rent. Definitely, this position can be defended on both- the grounds of affirmative

In the beginning, he was permitted to sell corn in the campus for three months on the humanitarian grounds; hence the institute did not charge him a monthly rent.

action and humanitarian principles. But the question which seeks attention is that, just like the legal entities bidding to offer their services in the campus conform to profit principles even in the highly regulated system and make up for monthly rent as decided by the IITB administration from time to time, equivalent to profit principles, Rajkumar's corn stall is also facilitating his sustenance in the market. Hence he must also apparently need to makeup for the monthly rent. Shielding him on the grounds on poverty would be too naive, given the poverty scenario of our country. on one hand and on a personal note, I feel that everyone is relatively poor, in terms of economics in particular and several other ways in general. For example disability and gender bias can be comprehended as two forms of several other forms of poverty. Given the campus reality, as far as my knowledge is concerned, during my stay, in the last one and half year, I personally have not come across even one campus eatery where the contract have been given to women or differently abled.

With reference to this debate, the my-

opic notions of justice can only ensue into disagreement amongst various stakeholders. To maintain the efficiency of the system, one needs to have a synergistic attitude and broader conception of the concepts. Given the diversity in the stakeholders with reference to this case, orientation of each stakeholder regarding the idea and access to justice would be very subjective and normative. To ebb the consequences of injustice, there is a dire need to acknowledge the varied and subjective

> **Given the complexity of the debate due to diverse socioeconomic orientation of the stakeholders, the very idea and access to justice to even one stakeholder would be a tradeoff with other three stakeholders.**

forms of justice in a legal jargon. Though adhering to subjective and varied forms of justice in a legal jargon seems to be a mirage on a prima facie note, but given our humanitarian academic orientation on one hand and institute's potential to unravel the societal problems on the other, we can see that IITB is attributed by efficacious and prudent administrative mechanisms. When this particular case is gauged under the lens of access to justice, one can discern that the considerate and judicious demeanor of the administration has been successful enough in mapping common platforms amongst diverse stakeholders: students of the campus, legal bidding entities as per the rules of the institute, IITB administration and a corn vendor- not absolutely, but definitely in a relative manner. While the prices in the campus are strictly regulated to cater to the needs of the students, they also have enough financial margin to facilitate the survival of the bidding agencies in the campus.

In the first year, the corn vendor was exempted from monthly rent; it gave him enough time to establish himself in the market. When he was issued a notice to pay the monthly rent, undoubtedly he saw it as a financial drain. But it also brought him at par with bidding entities who could have accused the system of being unjust. In this way, IITB administration streamlined the normative and subjective ideas of justice and delivered it in the form of plurality in justice. ✳

Abhay Kanwar

Abhay Kanwar is currently doing his M.phil in planning and development at the Humanities and Social Sciences of IITB. He has completed his masters from JNU Delhi and has a keen interest in research. He loves to be a part of nature, however paradoxical it may seem and is also a facebook freak.

Creative Bees at Fundamatics

ILLUSTRATION

Shreyas Navare
C'08, SJMSOM, H-13

Shreyas Navare, Mumbai, Senior Manager, Marketing and Corporate Communications at a private bank. He freelances as a Editorial Cartoonist for Hindustan Times. He has covered elections in 6 Indian states through the eyes of a cartoonist on behalf of HT. Shreyas has held many cartoon exhibitions, two of which were inaugurated by Dr. A. P. J. Abdul Kalam. His first solo international cartoon exhibition was held recently at Bangkok. His second exhibition was held at Nehru Centre recently. Cartoons featured in this issue are from the exhibition.

EZINE

Abhishek Thakkar

Abhishek Thakkar or just 'Thakkar' as he was known throughout campus is an alumnus of H5 from '03. Having a lot of it, he loved throwing his weight around, and escaped many a bumps which he'd have got for his PJs. Now he channels all that creative energy in designing beautiful, scalable web and mobile interfaces.

DESIGN

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Anand Prahlad is an independent graphic designer and artist. When not designing books, magazines, corporate identities or illustrating, he is an active gardener, culinary expert and amateur musician.
He runs www.magic-marinade.com, a food and travel blog, and also www.thenewvitruvianman.com, where he writes and illustrates articles on design, gastronomy and music.