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## A samwad about सामवादा

- Prof. Varadraj Bapat

Throughout the history, our ancestors have strived to make India the Vishwa Guru to spread the knowledge, and not Vishwa Vijeta. Continuing the same tradition, our present day visionaries and leaders like Dr APJ Abdul Kalam, have put forth an idea of making India a Knowledge Super Power by 2020. IIT Bombay, with its motto declaring "Jnanam Paramam Dhyeyam" (Knowledge is the Supreme Goal), bears a special responsibility towards achieving this goal.

To accomplish this task, however, is not going to be a cakewalk. India is facing multi-faceted issues: from the grave problem of depleting natural resources like water, minerals, and others, to the threats to our integrity and internal security, to large scale erosion in ethics and values in public as well as personal lives. Unfortunately, the current educational system and the curriculum do not discuss or address these issues. Without addressing these issues, without developing a national character for students, we are at a danger of indulging in what was termed as one of the seven social sins by Gandhiji; 'Knowledge without character'.

We believe that an initiative to begin some meaningful discussions, some dialogs a - samwad - on such issues is required. As a group of concerned faculty we would like to start a forum to initiate a thought process among the students about various issues of social and national importance.

The activities of the forum will be mainly aimed at making students realize the linkages between technology, research and the larger vision in which they are embedded, at linking S&T with India's development goals, at linking their education with ideas of a moral, ethical and nationalistic environment.

## MORE THAN ZERO

- The Growth of Mathematics in India



Evidence gathered by the study of ancient scriptures proves that ancient Vedic mathematicians belonging to India's Kerala School of Mathematics unraveled many of the enigmatic and complex formulae of Calculus centuries before mathematicians in Europe laid their claim to fame with their apparent discoveries. But unfortunately, due to our own ignorance, and neglect of our ancient scriptures, nobody has even the faintest idea that the mathematical discipline of Calculus and

- Swaroop Joshi

even a host of other significant breakthroughs were original Indian discoveries.

The boring and monotonous manner in which the subject is taught in schools had led many students to develop an aversion to mathematics. Such an aversion never ever goes, it's like a phobia that's permanently entrenched in their minds. On the other hand, ancient scriptures dealing with mathematics took up interesting problems related with the then prevalent day-to-day situations like the cow problem, the bamboo problem, the lotus problem, the cuckoo problem etc. to simplify complex mathematical equations, and make the subject interesting, almost playful. The Cow Problem, for instance, comes in the form of a verse which translates to "A cow gives birth to a

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## Education System In India: Then and Now

- Jaideep Joshi

Once upon a time, science was studied for the sake of knowledge, out of wonder, and out of a thirst to understand how the world functions. Naturally, there was respect for the world around, for other people, other beings, and God. About two centuries ago, this attitude was put to an end, and a quest for knowledge turned into a quest for increasing material satisfaction. Propelled by post-war economics, the quest for material enjoyment turned into an obsession with material possessions and disrespect for everything but oneself, under the cute guise of "development". This "development", along with exponentially increasing (read unsustainable) material prosperity, has brought with it exponentially increasing

dissatisfaction, inequality, conflict, and environmental degradation.

A paradigm shift is required as a first and major step today, even as we struggle to bring the negatives under control. It is worthwhile then, to take a look at what knowledge paradigms existed in the ancient world, particularly in India, that led to a harmonious and healthy society tuned to live with nature.

The end goal of human endeavor is always happiness, and the way a knowledge system thinks about happiness itself and ways to achieve it, is a major key to understanding it. The end goal of Indian Tradition is not just happiness, but eternal happiness. Indians can think of eternity because they believe in

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(More than Zero- continued from page 1)  
(she)calf every year (and) their calves themselves (begin giving birth), in 3 years time. Oh learned, tell the number of progeny produced by a cow during 20 years." This requires the understanding of summation series to solve.

The development of mathematics in India was closely linked to the need to determining the time and place in astronomy, which, in turn, were intrinsically important to the performance of rituals. In fact, the science of astronomy itself was called "Kalavidhana-shastram", the science for determination of time. Conceptually, Pi came into the Indian mathematical literature in the text called Sulvasutras in a totally different context than what one finds in other civilizations. In India, mathematics developed in the context of trying to solve problems of astronomy, which was also linked with day-to-day tasks that people performed. This was the focus of the text called Vedangajyotisha, which tries to relate mathematical concepts with the determination of the times of the sunrise and sunset, the movement of the planets etc. Mathematics, thus, is all pervasive in our day-to-day life. As mentioned in Ganitakaumudi of Narayanapandita, all elements of the universe have intrinsic elements of mathematics in their being.

The real quest for mathematics is to transcend from Ganita (finite) to Aganita (infinite). The Shantimantra of the Upanishads talks about the abstract concept of the infinite:

ॐ पूर्णमदः पूर्णमिदं पूर्णात् पूर्णमुदच्यते  
पूर्णस्य पूर्णमादाय पूर्णमेवावशिष्यते ॥

(Whole, this is whole, from whole comes out whole. If whole is subtracted from whole, what is left is still whole.) This verse illustrates ancient India had grasped the meaning of the two extremities of mathematics - on the one hand you have the zero, on the other, you have the infinite. Both are very difficult to understand. Both have very interesting characteristics and behavior, and they are inseparable. They fundamentally form the essence of Calculus, which strives to understand the notions of the infinitesimals and the finite, or the limits.

Mathematics of zero and infinity has been described beautifully by Brahmagupta and Bhaskaracharya, and as such, these are the earliest mentions one can find of

the complex concepts of Calculus. The concept of Zero or Shunya was not only, and necessarily a part of mathematics, but it had connotations that went much beyond mathematics. Its origins are in fact found in philosophy. The concept of Zero plays an important part in the Buddhist philosophy. Shunya also has an analogous relationship with the Lopa found in Panini's Grammar. Lopa in Samskrit means Zero.

### The Mathematical Verses

One of the styles of composition of mathematics in India's ancient scriptures, including the earliest references found in Sulvasutras before 800 BCE were in the style of Sutras. Patanjalisutras, Yogasutras, Paninisutras, Sulvasutras, Brahmasutras, Mimansasutras clearly show that almost all the branches of knowledge used to be preserved in terse form as Sutras, which were not metrical in composition. However, in the latter period most of the works - be it in the discipline of art and aesthetic or science and technology - used to be composed in metrical form. For example, the commentary 'Kriyakramakari' written by Shankar Variyar in 16th cent presents an accurate value of Pi (that is correct to 11 decimal places) in the form of a beautifully couched verse, and ascribes that to Madhava - a brilliant 14th century Kerala mathematician.

Madhava invented the infinite series Pi which is today called the Gregory-Leibniz series! He is also credited with the invention of infinite series for sine and cosine functions as well. In yet another Indian text Tantrasangraha, in the context of trying to find the precise position of the moon, the exact expression for the derivative of the sin-inverse function has been given in the form of a shloka.

We still do not know how our ancient scholars arrived at this, but these are truly fascinating inventions. It were inventions like these and the works on the sum of infinite geometric series by Nilkantha, which laid foundations for the advent of calculus in India at least a couple of centuries before its first appearance in Europe.

Unfortunately, there is so much ignorance compounded by the lack of preserved material that there are historians who still doubt that the place value decimal system could have had its origin in India.

### The Price of Neglect and Ignorance

Such ignorance has also led to discredit-

ing India and some of her illustrious Vedic mathematicians from many other discoveries. A startling case in point is the outstanding contribution of Aryabhata made in the 5th century to the field of intermediate analysis, a field which started developing in Europe only in the 17th century. In fact, the techniques employed by Aryabhata seem to have been too advanced to be noticed by Arab and Persian scholars and it did not get transmitted to Europe during the medieval period. It also does not find mention in some of the very modern works on history of mathematics. For example, what is known today as the Pell's equation, which is essentially a Diophantine equation, was actually formulated in a shloka form by Brahmagupta in 7th century, and later even by Bhaskara. Many of Indian discoveries happened more than 600 years before the concepts came to be studied at their conceptual levels in Europe.

Major discoveries in the foundations of calculus and mathematical analysis took place at the Kerala School. However, unfortunately, the books on mathematics written as recently as in 2007 by A. S. Posamentier do not have any mention of this contribution made centuries earlier by Madhava and the Kerala School. Misrepresentation of facts in works on mathematical history by other leading modern mathematicians like B. L. Van der Waerden has discredited and disregarded India's contribution. There seems to be a tendency to deny originality to Indian discoveries in mathematics. It's not been deliberately left out, but this is primarily the result of what our ignorance of our own contribution has led to. The system of learning in ancient India was verbal transmission of knowledge, not written. Modern mathematicians use diagrams to state the same thing.

Claude Alvares, renowned Goa-based environmentalist and scholar on Indian knowledge traditions says, "All History is elaborate efforts in myth-making. If we must continue to live with myths, however, it is far better we choose to live with those of our own making rather than by those invented by others for their own purposes." That much at least we owe as an Independent Society and Nation!

(Adapted from Prof. Ramsubramanian's talk in R. C. Gupta distinguished lecture series, October 2010. Prof. Ramsubramanian is a faculty in Dept.. of HSS)

# Encounter with Dr. Ravi Chopra

## An IITian Who took the Path Less Travelled By...!

People's Science Institute (PSI) is a leading voluntary organization that combines first-rate scientific work with a commitment to social justice, established by the group of IITians as a non-profit research and development organization. Its mission is, "to help eradicate poverty through the empowerment of the poor and the productive, sustainable and equitable use of available human and natural resources".

Dr. Ravi Chopra, an IIT Bombay alumnus, is the Director of People's Science Institute. He is known as a visionary, and idealist personality. He was born on April 14, 1947 and got his technical education in Metallurgical & Materials Engineering from the Indian Institute of Technology Bombay. He is a member of several committees of the Ministries of Rural Development and Water Resources, and the Planning Commission of India. (He serves as the managing Trustee of the Himalaya Foundation of New-Delhi.) He is consultant to various national and international agencies and is popular speaker on the development issues in India and abroad. He has written and co-authored fourteen books and special reports. He is a recipient of Lifetime Achievement Award on the occasion of the 35th Anniversary of International Service Society (2007).



government was unstable, the economy was in bad shape, and the people were not getting jobs.

It was after that episode some of my friends and I sat down and talked about our future. We thought, "Why should we, the cream of this country, look for jobs? Rather we should create the jobs". This was the turning point. We decided not to follow the conventional career path of IIT

### What are the origins of People's Science Institute and your involvement with it?

In 1964-65, I was one of the 'eccentric' students of IIT Bombay who did not wish to opt (go in) for industrial engineering but wished to work in the area of rural development. From the beginning I wanted to form a society which would do research work on the needs of the people. Normally a research society works on whatever subject interests it, but People's Science Institute moved away from this trend. We decided that we would only engage in the research that the people themselves desired. In the beginning, our work was limited to checking the pollution levels of land, air and water and to study other aspects connected with them. Gradually our work increased and many different jobs were included in our ambit. After much effort and going through many phases, people's Science Institute has established itself as an organisation that has done excellent work throughout the country.

### You seem to have chosen a different path, what was your thought/vision behind it? What inspired you to take up this path?

I was born around the time of Independence. First couple of decades of Independence were the time of nation building and everybody used to think in terms of nation building. For example, if

you are an engineer who was sent to work over construction of a dam, you didn't think you work for the dam, but for the nation building. I grew up in such an atmosphere. Then, in mid-60's, there was a series of events such as death of our first Prime Minister Pt. Jawaharlal Nehru, war with Pakistan, Severe drought in eastern India. We were living ship to mouth. Because of the drought, there was a shortage of the food-grains. Food aid arrived from the US and it was distributed from the ration shops. PM Lal Bahadur Shastri said, "we must tighten our belt, and those of us have enough of food should miss one meal a week so that others can eat". He also said, "We should grow grains, vegetables, fruit plants, wherever we can do that". This acted as a trigger for us. By that time we were undergraduates at IITB and were very excited over these things. We uprooted our hostel ground (Hostel-4) and started to grow vegetables over there.

A book named 'trriage' was published at that time which was written by the two American social scientist brothers, William and George Paddock. They said that there was no point to give to this country, this country was overpopulated and could not solve its problem. By the mid 70's they predicted that "people will be falling dead like flies on the streets of Indian cities" (This statement was quoted from the Triage). This picture really shook us a lot. It was also a time that the Indian

graduate and we would continue with the dream of nation building. Thus, we setup Front for Rapid Economic Advancement in India (FREA) in 1967.

### What were the Challenges at the beginning? Did you face an opposition (from family, friends, peers etc.) since its pretty odd for an IITian to take up career in social sector?

We encountered many challenges such as lack of support, downright opposition, and lack in resources and finance. During 1967, we started a student volunteer program to create a platform for Students to explore for a development related project in their holidays. When Drunu Roy (my colleague and the first distinguished alumnus of IITB) took over as a Head of FREA, he expanded it very significantly. He got students from various parts of the country to go and work at different locations which led to a lot of reaction from the parents of the members of FREA.

Board of Directors decided to stop this program. This led me to come back from US and redesign the program. Most of the work was done with almost no money. This experience taught us how to carry out development activities without money. We asked our friends who followed the conventional career path for donations. Soon we realized that with this kind of economical support we cannot go so far and finally help came when a

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# CAMPUS WARTA

Interested students,  
please contact,

Chirayu  
9833166779

Suranjan  
9819706446



## Abhyasika

If you've ever passed by YP gate at 7 pm, you might have noticed a unremarkable bunch of students waiting near the security outpost. They walk with a sense of purpose onto the main road and take the first left. Past the garbage scattered across the narrow street, up the hilly slope, and after a ten minute walk, they come to a stop. This is Phoolenagar, less than a kilometer away from the fashionable streets of Hiranandani, marked by poverty and inferior living conditions. These students are part of an initiative called Abhyasika, which aims at lifting the lives of children belonging to Phoolenagar through education. Every day, volunteers give two hours of their evenings to these children, helping them to do better at school, acquire knowledge and hopefully have a chance at a bright future. Apart from addressing a social cause, Abhyasika is a truly inspirational learning experience for all the volunteers. Abhyasika welcomes anyone with a strong desire to teach underprivileged children.

- Rajath Bhat ,Dept. of EE

Interested in donating bicycle,  
please contact:  
Deepak Patil  
9892263408

## Donate Bicycle Campaign

Children in rural India have to walk miles for going to school. Having or not having a bicycle can mean the difference between attending the school or not. In a humble attempt to remove this hurdle, an initiative was undertaken to collect the bicycles from passing-out students, and to distribute them to the needy children in rural and tribal areas. 39 used cycles were collected from the students in IIT, and the monetary support required to repair and transport them was willingly extended by some faculty members. The cycles were handed over to the beneficiaries at a function organized at Swami Vivekananda High School, Wada, Dist. Thane on November 27, 2010. This year more than 50 students can be benefited through this campaign conducted by Group for Rural Activities.



## GRA Camps

Semester-end GRA camps are the opportunities for students to actually know the rural India, the real India. These camps take us to a different canvass to which most of us had never been exposed. There we visit different development projects which bring an astounding change in the people's life. We meet real legends who become the vehicle of change in the rural setting and the people who witness and enjoy the fruits of change within. The memories which students carry with them once they return from this wonderful exercise cum experience become one of the howling part of their life.

During recent winter camp we visited three such places located in the Melghat, one of the most backward region in Maharashtra. First being Sampuna Bamboo Kendra (SBK) at Lavada. SBK strives to provide livelihood alternatives to the local tribal people by making useful bamboo products. A number of women are being empowered by becoming economically self-sufficient by several self-help groups. These activities have helped to break the age old tyranny of local money lenders.

The second project was Mahatma Gandhi Adivasi Dawakhana (MAHAN), where two devoted doctors provide medical facilities to the local tribal people who faces very inhuman health hazards because of the paucity of health facilities in these remote areas. Third project was an educational project. It was a hostel for tribal children in the neighbouring areas of Dharani block. Here we tried to analyse the utility of the present educational system for tribal children. Thereafter we visited such an experiment by a volunteer organization, Ekal Vidyalay, where they try to fill up the lacuna in the present education system for the tribal areas which also acknowledges children with local resources, local knowledge, values, and local need based lessons.

- Surendra Meena

## Sandesha: An Initiative

"Dear Soldiers,  
You might not get proper food,  
may not have a cosy bed, you may have to remain awake at nights,  
but you never complain.  
You give more than your best. You save us, our country and I simply love you."

This was what came out when we asked people to pour out their hearts in to words and write a letter to one's that guard us day and night. This was the aim of our "Sandesh" initiative conducted all over the institute this 23rd March. We put up blank post-cards and drop boxes in all the hostels and asked people to write it on the post cards. These post cards were sent to the battalions stationed at Siachen ready to sacrifice their lives to our motherland. We were initially skeptic about the participation from students but we were soon proved wrong. There was tremendous participation and many were so moving and encouraging to read.

- Samvad Team

## Supervised Learning Project (SLP) at CTARA

Engineering, entrepreneurship, and innovations! That's what IITs are established for. Through TD-SLP, CTARA is providing necessary exposure to IITians about the situations which are demanding engineering solutions through innovative ideas to solve complicated socio-technical problems. Selection of topics for SLP is based on the core values of CTARA; these are, focussing on bottom 80% of the Indian population, looking for the techno-social interventions among core sectors like water, health, food, livelihood, and concrete delivery to end user.

Since its inception, CTARA has been working on the projects which would accomplish its goal. Many faculties and students have been showing peer interest in carrying out grass root level research to try to live up with the goal for which IITs have been established. Now they have systematically integrated these projects in academia (The systematic process to execute such project for students has started from this year). Initial level projects are study projects where all the dynamics of problem and situations are studied and reported to IIT. In the intermediate level project, not only the problem is studied in detail but also some intervention is designed and suggested to stakeholders who are the people to whom it matters. The third level of SLP is one step ahead and expects end results through the implementation of the alternative suggested for improving the condition.

Outstanding work has been done through TDSL in Karjat and surrounding villages. It is available at URL: <http://www.cse.iitb.ac.in/~sohoni/pastTDSL/>. To sum up, TDSL projects attempt to do what is required than what can be done.

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German organization offered to purchase greeting card that are made by handicapped people. Getting the resources to do the work has always been a challenge.

### What was your aim behind establishing PSI?

When we started out we knew nothing about Development, we knew nothing about poverty, and we knew nothing about rural life as most of us in FREA came from middle class or well to do families of urban area. We didn't have clear ideas about what Development meant. As we began to do small projects with the help of students in summer time, they began to throw out a number of questions or issues like what is a nation, what is development. Analysing these experiences helped us to begin articulating these concepts in a very practical manner. During 1972, there was a major drought in Maharashtra and Gujrat. That was a major turning point for our understanding that why people are poor. Today we can say that the people at PSI are dedicated to nation building and our mission is to help in eradication of poverty in this country through the productive, equitable, and sustainable use of human and natural resources. Today we can formulate a very clear cut statement like these, but earlier we didn't have an idea about what we were doing. We also learned very important lessons from a few books, for example, a book named "Pedagogy of the oppressed" written by Paulo Freire 1969. In this book, he elaborated whole set of activities by which you can begin to work on oppression and poverty. We got theoretical spoon from Paulo Freire and we have our own experiences about the nature of poverty and oppression.

### How was your experience while providing technological solution to the community? What is the process of eradication of poverty and oppression according to you?

One of our early understandings was that science and technology cannot be the forefront in the social change, they are important tools but they come afterwards. Even today, much of the work of PSI does not begin with technology. Paulo

Freire argues that only the poor or the oppressed can fight their own battle. People like us can facilitate them, we cannot fight their battle. If you want to fight against poverty and oppression, you must identify the problems correctly, learn the process of dialog leading to conscientisation (type of awareness compels a person to act), make the poor or oppressed one realize about the problem and how to act on it. Usually people who are poor or oppressed are powerless. They don't have the capacity to fight oppression. For proper channelizing their activities, the first step is a process of dialog through which we can make them realise about their problems correctly. Once they are ready to build their capacity to carry out the action, the first step is the process of organisation building, since individually you are nobody but as a group you can be powerful. For example, in a factory individual worker is nothing but workers' union is much powerful. Once an organisation is built up, you can bring science and technology.

### How important is it for an IITian to work on the technological problems at the grass root level compared to industrial level?

I would say that it is as important for an IITian to work at the grass root level as to work at industrial level. A special thing about the IIT education is that it's based on problem solving approach; we are trained to solve the problems. This emphasis on problem solving approach makes us special. Thus if you learn how to solve problems, then whether it is a problem in a factory or it is problem in a village, you know how to solve it. An IITian makes a big impact in industrial world. Thus if they apply their problem solving mind to the problems of development, they would definitely make a difference.

### What is your message to current IITians? How do you think IITians can help to improve welfare of society while pursuing career in the conventional fields?

One of the lessons I learned early was, if you want to do something significantly, you have to be single minded. As you cannot ride over two motorcycles together. So it is very difficult to have a conventional career and do something significant that will impact society outside that ca-

reer. You can do something significant like Mr. Nilkeni or Mr. Narayan Murthy but they have done it through their career, they have built large enterprises, have given employment to lots of people, gone in a field which brings lots of foreign exchange etc. They have been able to do that, but I would argue that even they have been single minded about it. They did not allow one to be distracted by family raising like issues. Once they had achieved some significant success in that field, they had a platform where they began to do other things also. So it is very difficult to work on the huge issues of poverty or corruption and at the same time follow a conventional career. You have to be a selfless person without worries about your own well being and that is very difficult. When I and some of my friends decided not to follow conventional career, there was tremendous opposition from the parents. There is a very good line in one of the Rabindranath Tagore's poem, "Don't wait for what you believe."

(Dr. Ravi Chopra was interviewed by Md. Ilyas Soudagar, M. Tech. student of CTARA.)

## About Us:

इकलवार्द is a forum to express thoughts and discuss opinions about socio-economic, technological and cultural issues related to our society and nation. With an aim of spreading awareness about these issues and for initiating a dialogue among a wider student community, we are publishing this newsletter. We welcome your suggestions and feedback about this issue of इकलवार्द newsletter.

## Contact Us:

To share your opinions or to contribute in this newsletter, drop a mail to [samwad.iitb@gmail.com](mailto:samwad.iitb@gmail.com)

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## Jamshetji Tata : A Visionary Industrialist

– Abhijeet Alase

*"Freedom without the strength to support it and, if need be, defend it, would be a cruel delusion. And the strength to defend freedom can itself only come from widespread industrialization and the infusion of modern science and technology into the country's economic life."*

– Jamshetji Tata

Tata group once again came under a spotlight when the chairman of Tata Motors, Ratan Tata, presented India's first "one-lakh car", Tata Nano. Tata group, with its generosity has made a place of respect in our heart. Today, it is known as one of the best managed groups in the World. At the root of this successful group was one of the greatest pioneers India has seen in its History, Mr. Jamshetji Tata.

Born in a family of Parsi Zoroastrian priests, Jamshet was expected to follow the family tradition and become a priest. But instead, he went on to become the first businessman in their family. This was a difficult time to enter business. Political conditions were not favourable as British Empire looked to undertake whole India in its control. To start with, Jamshetji assisted his father for 9 years. In 1868, he started his own trading company. Just a year later, he acquired a bankrupt oil mill at Chinchpokhli and converted it to a cotton mill. With his entrepreneurship skills and valuable experience of his father, he was successful in selling the mill for a healthy profit in just two years!

Jamshetji knew very well how to use his capital. He realized that the industrial revolution was a key element in industrial success, and he was determined to take advantage of the new advances in technology and methods. At the time, railroads and telegraphs were beginning to be built in order to link various regions of India with one another. Tata incorporated these inventions into his industrial empire. He floated his enterprise, the Central India Spinning, Weaving and Manufacturing Company in 1874 with a capital of 1.5 lakhs, and consequently the Empress Mills at the age of 37 years. His acts reflected his brilliance in the field of business. Tata's textile mills were soon recognized to be the best managed of Indian-owned factories. Tata, in moves that were far ahead of his time, hired his managers carefully, and instituted policies that gave workers training, guaranteed pensions and tips, medical care, accident compensation, and daycare for women employees

who had children.

After visiting England he was excited by the prospects of setting up a steel plant. By 1880, his dream of building a steel plant that would compare with the best of its kind in the world was steadfast. Not only was it a gigantic task, it was even intimidating, as the contemporary Indian political scenario was not too optimistic as well. The industrial revolution that had touched and transformed most nations of the West, by passed India and made it difficult for this pioneer to make any attempt towards modernizing and industrializing the East. Tata spent his later life in realizing his dream of setting up an iron and steel company. His attempts were carried to completion by his son Dorabji and cousin Dr. R. D. Tata in 1912, when TISCO started its production of steel.

Tata was notable for his willingness to adopt innovations and use them to improve not only his business but the lives of Indian people. He also made innovation part of his daily life. He was the first man in India to drive an automobile in the city of Mumbai. It was Jamshetji who decided to break the mould, by venturing into industry through textiles. This was not the only evidence of his propensity for innovation. In Empress Mills, his first big industrial initiative, he introduced the ring spindle when the device had yet to come into general use in the US, where it had been invented. He experimented with a new form of management whereby he became a salaried managing director, reporting to a functional board of directors. All of this happened long before the term "corporate governance" was even conceived.

But apart from all these qualities, why Jamshetji stood out from other entrepreneurs of that time was because of his affection towards society. He always worked for the society, and helped it in his own way. The humanitarian, charitable and humble principles that the industrialist followed made him believe that it was essential to nurture the fine brains of Indians in order to bring them out from the

puddle of poverty. Jamshetji could never make his heart to believe in hands on charity. Therefore, he established the JN Tata Endowment in 1892 that helped Indian students to pursue higher studies abroad. One such success was followed by another and yet another until such a time when two out of every five Indians coming into the elite Indian Civil Service were Tata scholars. The Indian Institute of Science was established with similar focus where Jamshetji assured Rs 30 Lakhs from his personal fortune. But it was not before long years of wait that tangible results came out of the effort.

Following the path shown by Jamshetji, Tata companies continued the tradition of returning wealth to the society they serve. Two-thirds of the equity of Tata Sons, the Tata promoter company, is held



by philanthropic trusts that have created national institutions for science and technology, medical research, social studies and the performing arts. The trusts also provide aid and assistance to non-government organizations working in the areas of education, healthcare and livelihoods. One of the descendants of Jamshetji, J.R.D. Tata, wrote on the Tata firm's Web site about the family's business philosophy: "The wealth gathered by Jamshetji Tata and his sons in half a century of industrial pioneering formed but a minute fraction of the amounts by which they enriched the nation. The whole of that wealth is held in trust for the people and used exclusively for their benefit. The cycle is thus complete: what came from the people has gone back to the people many times over."

Jamshetji Tata will always be looked upon as a pioneer, and will remain a source of inspiration for entrepreneurs in future.

(Abhijeet Alase is a third year student of Engineering Physics Dept.)

(Education... continued from page 1)

cyclical time, not limited by a span of merely hundred years! For them, sensual happiness is temporary and the way to eternal happiness is Moksha, or liberation from the cycle of birth and death. (Incidentally, this notion also instills in them tremendous respect for all other life forms, as they are merely souls like themselves, passing through animal forms in the cycle of time.) This notion is apparent right at the beginning of any traditional text. All texts start with a prayer to the author's Ishta-devata, (or simply, Akshaya, "The Imperishable" as in the case of the Amarakosha). Next follows a prayer to one's guru, who is placed at par with the devata. The second wonderful result of such thinking is the respect given to one's opponent. The system followed in debating with an opponent is called purvapaksha-siddhanta. The author first states the view of his opponent (purvapaksha) and compiles all the arguments in its favour. To leave no room for prejudice, he himself gives even more supportive arguments, so that the purvapaksha is firmly established. Then he starts rejecting all points one by one, until his own view is established. It then becomes the siddhanta. Contrast this with today's debates, where the only motive is to turn down the points of the opponent, with no regard for the truth. Within limits, Indian knowledge systems not only allowed but encouraged material prosperity, as is evident from the superior technologies that existed even upto the eighteenth century, right from making various useful items like steel, ice, cloth, vaccines, through theoretical topics like astronomy, chemistry, philosophy, up to the extreme engineering witnessed in Indian temples.

There are various myths about Indian traditional education, saying it was open only for "higher" castes, that it was only available in Sanskrit and hence forbidden to most people, and the like. Let me start with saying that none have any ground.

Education was open to all. In fact, it was India from where Europe (where education was restricted to the Nobles) got the idea of education for all. These facts come from a source none other than the records of the British officers themselves! Dharampal, a Gandhian who analysed these records at England and Chennai for 10 years, has exhaustively published his findings in "The Beautiful Tree". It reveals very surprising facts, that there were schools in almost every village, that "lower" castes formed a major portion of the student strength, that most schools were run in local languages, that there were numerous centers of higher learning, that women received education from private tutors at home, and many more.

What then happened then to such a system? The answer is best given in the words of Gandhiji himself: "I say without fear of my figures being challenged successfully, that today India is more illiterate than it was fifty or a hundred years ago, and so is Burma, because the British administrators, when they came to India, instead of taking hold of things as they were, began to root them out. They scratched the soil and began to look at the root, and left the root like that, and the beautiful tree perished."

(Jaideep Joshi is a passing out student of Dept. of EE.)

Not as startling a discovery  
as the mummies of Egypt.

But surely worth knowing.



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