Address and interaction with the Students and Faculty of Veermata Jijabai Technological Institute (VJTI)  
Technology Education Empowers

I am indeed delighted to address and interact with the students and faculty members of Veermata Jijabai Technological Institute (VJTI) at Mumbai. My greetings to the Principal, Faculty Members, Staff, Students and distinguished guests. From my study of the website, I found that the institute has a vision to establish global leadership in the field of Technology and develop competent human resources for providing service to society. With this vision in mind, VJTI is creating intellectually stimulating environment for research, scholarship, creativity and innovation among the students. The graduates of the Institute should act as catalysts for transforming India into a developed nation before 2020. I congratulate the pioneers both present and past who have created and nurtured VJTI during the last twelve decades. Today, when I am in the midst of students of engineering and technology, I would like to talk on the topic “Technology Education Empowers”.

First I would like to present my experience of learning system design, system integration and system management while I was a student.

Learning integrated system design

While I was studying aeronautical engineering in MIT, Chennai, (1954-57) during the third year of my course, I was assigned a project to design a low-level attack aircraft together with six other colleagues. I was given the responsibility of system design and system integration by integrating the team members. Also, I was responsible for aerodynamic and structural design of the project. The other five of my team took up the design of propulsion, control, guidance, avionics and instrumentation of the aircraft. My design teacher Prof. Srinivasan, the then Director of MIT, was our guide. He reviewed the project and declared my work to be gloomy and disappointing. He didn't lend an ear to my difficulties in bringing together data base from multiple designers. I asked for a month's time to complete the task, since I had to get the inputs from five of my colleagues without which I cannot complete the system design. Prof. Srinivasan told me “Look, young man, today is Friday afternoon. I give you three days time. If by Monday morning I don't get the configuration design, your scholarship will be stopped.” I had a jolt in my life, as scholarship was my lifeline, without which I cannot continue with my studies. There was no other way out but to finish the task. My team felt the need for working together round the clock. We didn't sleep that night, working on the drawing board skipping our dinner. On Saturday, I took just an hour’s break. On Sunday morning, I was near completion, when I felt someone's presence in my laboratory. It was Prof. Srinivasan studying my progress. After looking at my work, he patted and hugged me affectionately. He had words of appreciation: “I knew I was putting you under stress and asking you to meet a difficult deadline. You have done great job in system design”.

Through this review mechanism Prof Srinivasan, really injected the necessity of understanding the value of time by each team member and brought out engineering education has to lead system design, system integration and system management. I realized that if something is at stake, the human minds get ignited and the working capacity gets enhanced manifold. That's what exactly happened. This is one of the techniques of building talent. The message is that young in the organization, whatever is their specialization, be trained to systems approach and projects, which will prepare them for new products, innovation and undertaking higher organizational responsibilities. Teacher has to be a coach like Prof. Srinivasan. Now let me discuss about convergence of technologies.

Convergence of Technologies

The information technology and communication technology have already converged leading to Information and Communication Technology (ICT). Information Technology combined with bio-technology has led to bio-informatics. Now, Nano-technology is knocking at our doors. It is the field of the future that will replace microelectronics and many fields with tremendous application potential in the areas of medicine, electronics and material science. When Nano technology and ICT meet, integrated silicon electronics, photonics are born and it can be said that material convergence will happen. With material convergence and biotechnology linked, a new science called Intelligent Bioscience will be born which would lead to a disease free, happy and more intelligent human habitat with longevity and high human capabilities. Convergence of bio-nano-info technologies can lead to the development of nano robots. Nano robots when they are injected into a patient, my expert friends say, it will diagnose and deliver the treatment exclusively in the affected area and then the nano-robot gets digested as it is a DNA based product.

Convergence of ICT, aerospace and Nano technologies will emerge and revolutionize the aerospace industry and electronics leading to nano computing systems. This technological convergence will enable building of cost effective low weight, high payload, and highly reliable aerospace systems, which can be used for inter-planetary transportation.

Now I would like to describe my visualization of the distinctive profile of India by 2020.
Distinctive Profile of India by 2020

1. A Nation where the rural and urban divide has reduced to a thin line.
2. A Nation where there is an equitable distribution and adequate access to energy and quality water.
3. A Nation where agriculture, industry and service sector work together in symphony.
4. A Nation where education with value system is not denied to any meritorious candidates because of societal or economic discrimination.
5. A Nation, which is the best destination for the most talented scholars, scientists, and investors.
6. A Nation where the best of health care is available to all.
7. A Nation where the governance is responsive, transparent and corruption free.
8. A Nation where poverty has been totally eradicated, illiteracy removed and crimes against women and children are absent and none in the society feels alienated.
9. A Nation that is prosperous, healthy, secure, devoid of terrorism, peaceful and happy and continues with a sustainable growth path.
10. A Nation that is one of the best places to live in and is proud of its leadership.

Integrated Action for developed India

To achieve the distinctive profile of India, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for integrated action: (1) Agriculture and food processing (2) Education and Healthcare (3) Information and Communication Technology (4) Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country and (5) Self-reliance in critical technologies. These five areas are closely inter-related and if progressed in a coordinated way, will lead to food, economic and national security.

India’s future missions

During the next decade, India will have the following missions:
1. Agriculture and Food processing: Increase the productivity into 3.4 times and concentrate on Food processing and marketing. Annual investment is around $20 billion.
2. Infrastructure: Apart from rural and urban infrastructure, one hundred million homes have to be built with energy efficient and water efficient systems. Annual investment in this sector will be around $80 billion per year.
3. Automobile: The export has to be 50% of our output. We are expecting a business volume of $200 billion by 2016 from the existing $45 billion.
4. Ship Building: High Dead weight ships have to be built in the country. This will have a business volume of over $50 billion.
5. Information and Communication technology: We have to keep pace with the growth spurt of global recession by applying ICT for India. We are expecting to reach business volume of $200 billion per year by 2012.
6. Pharma: India must account for at least 25% of generic drug produced world over. Pharma vision aims to reach the business volume of $50 billion by 2016.
7. Aerospace: 70 seater passenger jet aircraft has to be designed and developed involving 20 billion dollars of market for the next 10 to 15 years.
8. Rail vision: Railway length has to be increased, metros have to come for faster transportation and multi-level station systems have to become operational to reduce city crowding, average speed of the train has to be doubled. Average annual investment will be over $25 billion.
9. Energy Independence: By 2030, we should attain energy independence through renewable energy sources such as solar and wind; nuclear and bio-fuels for transportation. Average annual investment will be over $30 billion.

Now let me talk about the present economic environment.

Economic Environment

I was asking myself what type of innovation is needed to enrich the Indian economy and other world economies which are presently in turbulence. I had discussion on this subject with the experts at Indian Institute of Management Ahmedabad few days back. It came to light that the Indian economy will be less affected due to the world financial crisis. This is due to (i) the Indian banking system has always been conservative which has prevented the crisis (ii) The liberalization process in India has its checks and balances consistent with the unique social requirements of the country (iii) The Indian psyche is generally savings oriented and living within means is part of the mind set. This situation has reduced the effect of global turbulence in the Indian economy. However, the resultant effect will be reduction in export and reduction in outsourcing. The drop in annual growth rate of GDP could be around two percent. This is the time we need innovation in our thinking to rejuvenate the agricultural sector particularly through value addition and the small and medium scale industries and enterprises for making higher levels of contribution to the GDP. Simultaneously, we have to enhance the rural and urban infrastructure particularly through the establishment of 7000 PURA complexes (Providing Urban Amenities in Rural Areas) spread in different parts of the country. The mission of PURA is employment generation with value added skills through connectivities.

PURA Mission: PURA envisages development of infrastructure for bringing rural prosperity through creation of three connectivities namely physical, electronic, knowledge leading to economic connectivity. The number of PURA for the whole country is estimated to be 7000 encompassing over 600,000 villages. The theme of PURA, apart from concentrating on reinforcing agriculture, will emphasize on agro processing, development of Rural Craftsmanship, dairy, fishing, silk production, so that the non-farm revenue for the rural sector is enhanced, based on the core competence of the region. Also the PURA complexes will be driven by renewable energy such as solar, wind, bio-fuel and conversion of municipal waste into power. In this approach, the aim is to make sustainable development using the core competence of the rural sector.

Periyar PURA (Tamil Nadu): I have worked with Periyar PURA Complex pioneered by Periyar Maniammai College of Technology for Women, Vallam, Thanjavur consisting of a cluster of 65 villages having a population of over one lakh for the last 5 years. This model PURA complex has all three Connectivities - physical, electronic and knowledge - leading to economic connectivity. This has resulted in large-scale employment generation and creation of a number of entrepreneurs with the active support of 1800 self-help groups. Two hundred acres of wasteland has been developed into a cultivable land with innovative water management schemes. Villagers are busy in cultivation, planting Jatropha, herbal and medicinal plants, power generation using bio-mass, food processing with dedicated marketing centers. This model has emanated independent of any government initiative by a Women Engineering college.

VJTI PURA

On similar lines, VJTI may like to take up a rural development mission in outskirts of Mumbai. At Vadala, VJTI has already adopted a school where you are training the students and teachers in maths and English. In addition, you are having a skill upgradation programme at Vadala for high school dropout. I would suggest VJTI with it strength of 3200 students and 200 faculty members mount a full-fledged development programme for Vadala and adjoining villages where nearly 30 to 40 thousand citizens live. The aim should be to provide these citizens with education, skill, value added employment, healthcare, potable water, renewable energy and environmental upgradation. This action will inspire the students, since apart from learning, they will be directly contributing to societal growth. They can study the core-competence of the region in agriculture and fishing and mount a programme for overall economic development of the rural complex. Also, there is a need for introducing artisan based industries which will provide sustainable revenue to the farmers. In essence, VJTI PURA should transform Vadala and the neighbouring villages into developed region of Maharashtra within the next five years.
The message here is: PURA is an integrated sustainable rural development programme with focus on employment generation through rural entrepreneurship by providing physical, electronic, knowledge and economic connectivity. PURA is a tool for bridging the Rural – Urban divide. Friends, I would like to present the life of a street boy who with his determination and perseverance became a noble laureate.

Birth of Creativity in a difficult situation

Mario Capecchi had a difficult and challenging childhood. For nearly four years, Capecchi lived with his mother in a chalet in the Italian Alps. When World War II broke out, his mother, along with other Bohemians, was sent to Dachau as a political prisoner. Anticipating her arrest by the Gestapo, she had sold all her possessions and given the money to friends to help raise her son on their farm. In the farm, he had to grow own wheat, harvest; take it to miller to be ground. Then, the money which his mother left for him ran out and at the age of four and half years, he started sometimes living in the streets, sometimes joining gangs of other homeless children, sometimes living in orphanages and most of the time hungry. He spent the last year in the city of Reggio Emelia, hospitalized for malnutrition where his mother found him on his ninth birthday after a year of searching. Within weeks, the Capecchi and his mother sailed to America to join his uncle and aunt.

He started his 3rd grade schooling afresh over there and started his education, interested in sports, studied political science. But he didn't find interesting and changed into science, became a mathematics graduate in 1961 with a double major in Physics and Chemistry. Although he really liked Physics, its elegance and simplicity, he switched to molecular biology in graduate school, on the advice of James D Watson, who advised him that he should not be bothered about small things, since such pursuits are likely to produce only small answers

His objective was to do gene targeting. The experiments started in 1980 and by 1984, Capecchi had clear success. Three years later, he applied the technology to mice. In 1989, he developed the first mice with targeted mutations. The technology created by Doctor Capecchi allows researchers to create specific gene mutations anywhere they choose in the genetic code of a mouse. By manipulating gene sequences in this way, researchers are able to mimic human disease conditions on animal subjects. What the research of Mario Capecchi means for human health is nothing short of amazing, his work with mice could lead to cures for Alzheimer’s disease or even Cancer. The innovations in genetics that Mario Capecchi achieved won him the Nobel Prize in 2007.

Noble laureate Capecchi life indeed reveals the melody from Pinocchio: -

“When you wish upon a star,
Makes no difference who you are
Anything your heart desires
Will come to you.”

Conclusion

While concluding, I would like to share with you an inspiring message from Maharishi Patanjali in Yoga Sutra:

“When you are inspired by some great purpose, some extraordinary project, all your thoughts break their bounds, your mind transcends limitations, your consciousness expands in every direction, you will find yourself in a new great and wonderful world. Dormant forces, faculties and talents become alive and you discover yourself to be a greater person by far than you ever dreamed yourself to be”.

I am sure, the education system in Veermata Jijabai Technological Institute will provide the inspiration to kindle the dormant forces, faculties and talents among all the students and create the confidence that “I can do it”, “we can do it” and the “nation will do it”.

My greetings and best wishes to all the members of VJTI success in their mission of becoming societal transformers of this region.

May God bless you.

Oath for Engineering Students

1. Engineering and Technology is a life time mission. I will work, work and work and succeed.
2. Wherever I am, a thought will always come to my mind. That is what process or product I can innovate, invent or discover.
3. I will always remember that “Let not my winged days, be spent in vain”.
4. I realize I have to set a great technological goal that will lead me to think high, work and persevere to realize the goal.
5. My greatest friends will be great scientific-technological minds, good teachers and good books.
6. I firmly believe that no problem can defeat me; I will become the captain of the problem, defeat the problem and succeed.
7. I will work and work for removing the problems faced by planet earth in the areas of water, energy, habitat, waste management and environment through the application of science and technology.
8. I am as young as my faith, as old as my doubt; As young as my self-confidence, as young as my fear; As young as my hope and as old as my despair. I will develop faith, self-confidence and hope.
9. My National Flag flies in my heart and I will bring glory to my nation.