



A Report: One Day Workshop on

“CHANGING CHARACTERISTIC OF ENGINEERING EDUCATION”

(Bridge course and Design Engineering)

organized at

Gujarat Technological University

Date: 9th August 2014

- “.....though GTU is 6 years old and IIT, Delhi is 50 years old, yet some of the initiatives, taken by both the engineering organisations, are the same.”
- “.....our emphasis should be on producing students who are not only “job seekers” but also “job creators.”
- “Students should now not only be taught “how things work?” but also “how the world works.”

From Dr. P.V.M.Rao’s speech

Venue: B-0, Conference hall, GTU Chandkheda Campus, Ahmedabad

Workshop on Changing Characteristic of Engineering Education at GTU

More than 200 faculties from across Gujarat participated in the workshop including Dr. G.P . Vadodaria, Registrar, GTU , Dr. N. M. Bhatt, Coordinator-UG syllabus committee and Prof. Siddharth Jadeja, Bridge Course Co-ordinator, GTU.

At the outset **Dr G. P. Vadodaria, Registrar, GTU** welcomed eminent technocrat Dr. P. V. M. Rao Professor, Mechanical Engineering Department, IIT Delhi.

A teacher is a life- long learner who keeps on growing with his mounting knowledge and experience. A very dignified and broad minded Dr. P. V. M. Rao Professor, Mechanical Engineering Department & Coordinator, Student Innovation Center, IIT Delhi was invited to elucidate the significance of design aspect and the changes in the pedagogical practices which are required to be implemented.



Engineering- From past to Present: Dr. Rao started his speech with the appreciation of GTU and its efforts mentioning that though GTU is 6 years old and IIT, Delhi is 50 years old, yet some of the initiatives, taken by both the engineering organisations, are the same. The dire need to change the curriculum was emphasized highlighting that in the past, knowledge acquisition was the most important. But in the 21st century the application of knowledge is of greater importance. He asserted, **“Multi-disciplinary approach is the need of the hour as no product building/design can take**

place in single discipline.” The rational motive of team work was also brought into light. Self-study, team based learning and experiential learning must be encouraged. He asserted that the boundaries among engineering disciplines are becoming blurred. Hence, our emphasis should be on producing students who are not only “job seekers” but also “job creators”. The pupils must be encouraged to develop leadership skills which will help them to be responsible citizens. For this purpose, IIT, Delhi has introduces a course titled “Professional Ethics & Social Responsibility” and it is encouraging that GTU has introduced a similar course. Students should now not only be taught “how things work?” but also “how the world works”.



IIT Delhi Initiatives in Curricula: To confront the challenges in the 21st century, IIT Delhi has introduced four new courses in the First Year :Engineering Visualization, Introduction to Engineering, Product Realization and Introduction to Specialization which aim to inculcate and hone the skills like technological literacy, mental visualization skills, project management skills, synthesis skills, communication skills, collaboration skills, problem solving skills and creative thinking skills. In these courses, the students have the flexibility to earn design credits beyond classroom. The first year courses are taught by an experienced teacher. Dr. PVM Rao himself conducts a class of nearly 800 students for a first year subject. The students are

educated on how research in science/engineering has enormous impact on our day-to-day lives. The syllabus emphasizes how engineering acts as a vehicle for social and economic development. In this subject the students learn that an inter-disciplinary and collaborator approach is required for developing an engineering product. As a teacher he also shared his administrative technique of controlling the mass of 800+ students in a hall where all the students are assigned the seat numbers and teaching assistants verify the student's attendance by noting down the absent numbers. Those students who fulfil minimum attendance criteria are declared pass. In the subject of **Product Realization**, the students are provided with the product building experience very early in the program. They are exposed to the concepts involved in product realization via "learning by doing" in teams very early in their programmes. In **Introduction to Specialization**, the students are given Hands-on exercises including Product Dissection Exercises in Smaller Groups, shown a movie/video pertaining to specialization with a preamble and post screening discussions, taken for lab visit related to on-going cutting-edge-research and also illustrated with the products/innovations which has reached people and made a large scale impact.

Other Initiatives by IIT Delhi: Inclusive Innovation Course, Medical Device Innovation Course, Student Innovation Center, Institute Open House Team Based Product Building Initiatives, Design Innovation Center, Technology Business Incubation Unit & Technology Parks. Such opportunities pave a way for the learners to harmoniously develop in their own way and carve a niche of their own at the end of four years.

Design and Innovation as Third Pillar: Underlining the role of design & innovation in Engineering, Dr. Rao highlighted that the present generation of students is showing a unmatched interest in design and innovation. As a result, the universities are taking up the role of addressing grand challenges, facing our society and are becoming public spaces for innovation. Thus, the emphasis is now on development of ecosystem to take innovative ideas from labs & classrooms to industry & society. He also focused on the integration of technology with the usability along with its reachability to the stake holders. He encouraged need driven projects for which the students must be clear about the need of the project by their interaction with the users or the common mass .To make this feasible, the communication skills and interpersonal skills should also be honed.

He talked in brief about **Team Based Product Building Initiatives by Students:**

- **FSAE Formula One**
- **SAE Mini Baja**
- **CANSAT** (Can sized satellite)
- **Robotics Club**
- **IGEM** (Genetically Engineered Machine)
- **Robosub** (Underwater Submarine)
- **ENACTUS** (Community for clean cook stoves)
- **Boeing National Aero modeling Initiative**
- **ASME HPVC** (Human Powered Vehicle)

He emphasized on the significance of participation in some of the unique event for the students. Such events offer the students a real platform to exhibit and compete at an international level. He profoundly appreciated the success of GTU-affiliated Colleges in the ASME HPVC held at IIT Delhi, 2014. He explained how active participation in such events enables the students to apply their

knowledge with hands-on experience and also provide an exposure to real life technological challenges.

Teaching –learning process: Dr. Rao asserted that the fundamentals of learning have not changed. **A student learns one quarter of his or her knowledge from the teacher, and another quarter from using one's own intelligence; a third quarter is acquired from interaction with other students, and a fourth quarter is acquired through engaging in real-world experiences.** Evidently, a faculty while teaching in the class is just one quarter of the learning curve and consequently, the conventional methods of teaching will not work in the current scenario. The real world experiences and being self-dependent and interacting with the peers also play a vital role in the teaching learning process. Thus the role of a teacher has changed dramatically and hence we must be geared up to welcome this radical change.

GTU from Dr. Rao's perspective (Dr. Rao's viewpoint on GTU):

Dr. Rao: IITs have taken significant steps for bringing design orientation, creating linkages between industry-academia and society and more practice oriented curricula during its last 50 years. But certainly looking at the direction of GTU (which is a 7 year old university) which is trying to ensure all the above mentioned agendas, it seems that **GTU is one among the very few state universities which has a clear vision and commitment.**

He further added that most of the innovative initiatives are student driven at IIT Delhi campus likewise **GTU Innovation Council has also taken right steps in making the innovation movement student driven.**

He added that **efforts in IP creation and large scale IPR initiatives at GTU are unique interventions by any state university at such a young stage.**

Moreover he admitted that the concept of bridge course and efforts to make it a high quality program to harness creative potential of First Year Engineering students draws parallel with some of the beautiful initiatives at IIT Delhi and others. Now the next responsibility is to maintain the quality and periodically add value to meet its desired goal.

He shared that **in many national competitions even students of GTU have outperformed many other IITs and NITs.** During 'Human Powered Vehicle Design' competition at IIT Delhi, GTU students of B.H Gardi college stood 2nd nationally. He emphasized that many more hidden talents might be there across the colleges of GTU and the right steps needs to be taken to scout and give them a platform so that they can compete at national and international levels. GTU through its innovation council and other steps (like MWTCs, OSTCs and S4 Extension Centers) is trying to make this arrangement.

He appreciated the leadership of the University for giving a clear goal and target with the timeline so that a state university can perform at par with others like IITs in days to come. **He appreciated over all agility of the leadership and processes at GTU which takes swift policy decisions for pedagogic interventions** which is a main road block even in many nationally reputed institutes. **The agility and humility with which the policy makers have led the effort are unique.**

Dr. Rao: The pedagogic interventions at GTU seems to be inclusive as the authority at the university has brought every possible expert from institutes like IIT, IIM and others and tried to take their inputs and incorporate them where ever possible. This will take the efforts to a new height as more and more people will take ownership of this massive change via academic transformation.

The session ended with the vote of thanks by **Dr. N. M. Bhatt**.

Photo Gallery



Report prepared by Divyesh Bhagat, with inputs from Hiranmay Mahanta