"A Reflection"

By the Trailblazers of Indian Engineering Education Sector

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During this year's survey, many pertinent questions and concerns emerged after having interacted with Vice-Chancellors, Directors, Deans, Faculty members and Students of various engineering institutes across the country. A combination of factors and issues were needed to be addressed and discussed. Thereby, in the context of current engineering education scenario, a few eminent Gurus of the Indian engineering education sector were requested to provide their insight into and perspective on the following questions for a better understanding of the engineering education.

1. In the context of changes happening in engineering education in current scenario what kind of steps should be taken for coming years by the engineering institutes in India?

Thapar University, Patiala

Prof. Prakash Gopalan, Director

Lack of infrastructure and research facilities are the biggest challenges before the faculty and students alike. The immediate thrust to steer educational reforms should be on job-oriented education in terms of curricula, practical exposure and teaching methodology, competent faculty and quality infrastructure like labs. The norms for granting approval to institutions of higher learning and the various courses run by them should be made more stringent. Inspection teams should assess the quality of faculty and infrastructure at these institutions before giving them the go-ahead.

College of Engineering, Pune

Prof. A. D. Sahasrabudhe, Director

There are two distinct areas which need to be addressed by engineering institutes.

1. ***Learning to Learn:*** Technologies are getting outdated so rapidly that a student will have to engage in engineering practices which he has never learnt during his 4-year education. Hence, stress on fundamentals, critical thinking and analytical skills is very important in empowering a student to learn any new subject on his own.

2. ***Outcome-based Education and Accreditation:*** All institutes shall have to clearly define vision, mission and goals, programme, education objectives and programme outcomes and prepare the curriculum content to achieve the objectives.

Hindustan University, Chennai

Mr. Ashok Verghese, Director

Globalisation and rapidly evolving technologies are driving profound changes in the role of engineering in society. The changing workforce and technological needs of a global knowledge-economy are dramatically changing the nature of engineering practices, demanding far broader skills than academic awareness in the field. Engineering institutes must raise awareness about the importance of technological innovation and competitiveness in engineering research.

Given the advanced nature of engineering application and nature of new technologies, Engineering Institutes must upgrade their training facilities, especially the laboratories. Outdated equipments should be replaced with the latest ones. Teachers should be provided with tools & high-speed online facilities to access & equip their intellect with the latest contents & courseware. Research augmentation in the Campus should be the prime focus besides delivering quality content & publications.

ITM University, Gurgaon

Prof. Prem Vrat, Vice Chancellor

Challenges in Engineering Education and Initiatives Needed:

There is a compelling need of the society to develop human resources through education and knowledge management for the social and economic growth of our nation. Whereas, there is going to be global shortage of quality manpower in the niche of science

and technology, the outcomes of the fast emerging developments in technology and science the world over shall hugely impact and transform the engineering landscape and human society. The engineering institutes in India need to measure up to the future challenges and outperform to stay competitive internationally.

Essential Steps Needed :

Some of the most essential initiatives recommended to the engineering institutes are as follows:-

(a) Create excellent research infrastructure, muster funds and bring on-board faculty with potential and interest in research.

(b) Provide academic and research environment and superior mentoring by some of the leading academics and scientists of the country to inspire and lead the faculty and the students in creativity, innovation, research and technology management.

(c) Create a strong foundation of academic rigour based on two main pillars of 'quality' and 'excellence'. Let quality reflect in all our activities.

(d) Bring on board a good faculty community, including those with international experience of having worked in eminent world-class universities, and expose them to the latest technological advancements on sustained and regular basis. Let them not only be aware of such advancements, but also enable them to develop competencies in their domain subjects so as to enable them effectively impart the same to the students.

(e) Full academic autonomy and flexibility. Update curriculum periodically, keeping the needs of the industry and the society in view.

The entire academic and administrative processes must be made transparent and well woven in professional ethics and values.

IEC Engineering College, Greater Noida

Dr. Kulneet Suri, HIO

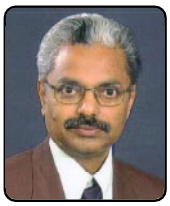
The continuous emphasis on computers and information technology being wonderful tools, but not solutions, must go on at the college level as well. Changes to engineering curricula should come in two categories: 1) Changing the way we teach in view of the new student' attitude and preparedness, and 2) Changing the way we teach in view of the proliferation of computers, information technology (IT), and new scientific software that is available.

Today, more than ever before, students need to see, feel and experience by themselves. Additional hands-on visualisation can be accomplished by increasing the laboratory components of courses, as well as by emphasising the need to conceptualise and to formulate problems. Every engineering course should have a laboratory component taught simultaneously with that course. Another issue to work on is in changing students' attitude, recitation sections and attendance. We need to communicate with students in a way that emphasises the fundamentals in a manner that they can appreciate. We need to find new ways to reach the students' minds and engage them both inside as well as outside the classroom.

Next, we have to maintain a balance between theoretical, experimental and computational work, and expose students to all three. We have to seamlessly integrate experimentation, analytical work and computation. Every day, with improved computational tools reaching the market, the necessary skill sets to solve engineering problems come into question. Some universities, such as Drexel and Northwestern, are trying a new approach to engineering education. They are introducing engineering subjects to students from the first year. I find this idea interesting. The results of this approach should be studied to see if it motivates and educates students better.

Kongu Engineering College, Erode

Dr. S. Kuppuswami, Director



Steps to be taken by the engineering institutes of India in the context of changes happening in engineering education in current scenario:

★ Institutes have to reorient all their activity for the paradigm shift from output-based education to outcome-based education (i.e) from a mere academic performance like results, placement, etc. The institutes have to concentrate on what contribution a graduate is expected to make to the industry and society. The skill, knowledge and attitude for meeting these expectations are to be developed in the institute. The following factors need special attention in this context:

★ Curricula and syllabi need continuous revamping and update

★ Delivery methods will be required

★ Assessment and Evaluation

★ Constant updating /upgrading of infrastructural facilities

★ Continuous training of faculty to update/upgrade their skill, knowledge and delivery methods

★ Strengthening industry partnership

★ Value-added courses for the students to keep pace with technology and industry/societal needs and to bridge the gap in curriculum

- ★ Strengthening of basic concepts of students on Science and Technology
- ★ Thrust on imparting soft skills for students
- ★ Multidisciplinary approach
- ★ Practical orientation in addition to theoretical concepts

PEC University of Technology, Chandigarh

Dr. Manoj K. Arora, Director

It has been said, "The only permanent thing in engineering education is change." This statement reflects the influence of science and technology on our society and the response of academia to meeting new societal needs. For example, many engineering curricula nowadays include several courses on computational technology, where few such courses were around 25 years ago. Recent advances in manufacturing, materials and other subjects are making their way to engineering curricula. ABET requirements for accreditation keeps changing every 10 years or so. Such change is, of course, healthy and it should lead to better-prepared engineers. Recognising this, a large number of universities have undertaken extensive review of their undergraduate programme in recent years. The Association of American Universities (AAU) conducted an extensive Survey of Undergraduate Education Activities in 1994. According to that survey more than half of the responding universities (53) had begun comprehensive review of undergraduate education on their campus, or were in the process of developing plans for improvement of undergraduate education. Engineering schools are definitely part of this change. We have changes introduced in the engineering curricula as a result of research and development and also in response to societal needs such as biotechnology, telecommunication networks, humanities, courses etc. It is my contention that it is now time for yet another overhaul of engineering curricula. We have to adjust our educational system to address student's need, concerns, and most important of all, student's attitude and expectations. If we do not soon change the way we educate engineers, the quality of graduating engineers will decline.

FST, ICFAI University Dehradun

Dr. R.C. Ramola, Dean

Engineering education should be designed in such a way that it could be easily applicable to the industry and corporate world. It should be more attractive to the students who aspire to be engineers. Always, there should be more job opportunities. For good engineering education in India, the following steps should be taken for the coming years:

1. The curriculum must be upgraded from time to time. New courses must be introduced which are application-oriented.
2. Project courses may be introduced so that student's thinking is more practice-oriented.
3. Students should be encouraged to do internships in industries at least for six months.
4. Industry-Institute Interaction activities should be more effectively done.

Q2. Is the college involved in research and innovations? What are some of the interesting steps or projects that have been undertaken by your institute for development of research and innovation? Additionally, how is faculty encouraged to undertake research and bring innovation to the students and classroom?

Thapar University, Patiala

Prof. Prakash Gopalan, Director

★ Over the years, Thapar has grown by leaps and bounds as a research-based university. Research being one of key focus areas, the University keeps on encouraging students and faculty members at all levels to undertake original research work. During the last five years, the faculty members of the University have published over 2,000 research papers in peer-reviewed impact factor journals.

★ The faculty of the University has also filed 12 patents. The University will focus new research on IT, Biotechnology, Structures, Materials Science (Nano technology) and Energy.

★ SAI Labs (Sophisticated Analytical Instruments Laboratories) is a unique facility at Thapar University. Its main objective is to carry out high-end testing, consultancy & research. In addition to research programmes, it was envisaged to have state-of-the-art testing & characterisation facility to cater to the high-end testing needs of the industry, society as well as educational institutes. It is recognised as Environmental Laboratory by Ministry of Environment and Forests (MoE&F) and the Punjab Pollution Control Board (PPCB).

★ The World Bank-sponsored TEQIP (Technical Education Quality Improvement Programme) project has selected Thapar University as the only institute in Punjab. A grant of Rs. 12.50 Cr. has been offered to TU with an objective to increase PG intake and enhance R & D.

★ Also, the University has signed MoUs with several international universities such as University of Waterloo, Canada; New Jersey Institute of Technology, USA; Trinity College, University of Dublin; University of Texas, Dallas; University De Aveiro (UA), Royal Melbourne Institute of Technology, ISA Group Lille, France; Brown University, the USA; University of Twente, the Netherlands; and University of Missouri-Kansas City, etc. in order to create new synergies and enable opportunities for establishing research centres and industrial corporations.

★ Two faculty members of Thapar University's civil engineering department are part of the Ireland-India Concrete Research Initiative, in which Trinity College is also involved.

College of Engineering, Pune

Prof. A. D. Sahasrabudhe, Director

The institute is highly active in R & D and conducting various Government and industry-sponsored projects worth Rs. 638.75 Lakhs. It has recently got associated with IIT Bombay for a Research Project of the State government, worth Rs. 39 crore. The institute has a state-of the art infrastructure. It has well-equipped laboratories, workshops sponsored by premier industries like Kirloskar Oil Engines, Premier Ltd, Cognizant, Eaton, Baja Auto Ltd., IBM, NVIDIA, etc.

Some of the Research initiatives the institute has undertaken:

★ A noticeable increase in funded research projects from agencies such as AICTE, MHRD, DST, World Bank, UGC, BARC-BRNS, ISRO, Defence departments.

★ The institute has Participated as a LEAD Institute in MHRD-World Bank's Project TEQIP in both the phases.

★ Funds were received for establishing TWO Centres of Excellence from TEQIP-World Bank.

★ COEP has received funding for a research project from Rajiv Gandhi Science and Technology Commission, Government of Maharashtra. COEP will be working with IIT Bombay on this project.

★ Organisation of International/National Conferences, Winter Academy, Summer schools in the prevalent research domains.

★ Significant increase in the research outputs such as 1661 publications, 9 patents received (28 applied), 44 books, monograms, technology transfers, etc.

Innovation and Entrepreneurship Development Centre (IEDC)

Recently, an Innovation and Entrepreneurship Development Centre (IEDC) has been sanctioned to COEP by the National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, Government of India.

The projects that have so far been taken up for creation of commercial products under IEDC at COEP are:

★ Indigenous Solar Energy-Based Efficient Biodiesel Production Plant.
★ Development of a Power-Plant Based On Solar Organic Rankine Cycle.
★ Development of Nutritionally rich Bio-Compost from Garden and Kitchen Waste.
★ Design and development of 'Distribution Station' for automated production line.
★ Design and Development of Autonomous Underwater Vehicle.

Hindustan University, Chennai

Mr. Ashok Verghese, Director

The curriculum and activities of Hindustan University encompass and promote innovation-led education, which empowers the students as well as teachers to compete and bring laurels in Global Design Projects, International and National events.

With a view to further research and innovations, Hindustan University has developed strong relationships with Universities / Institutions / Organisations across the globe for different areas of cooperation which include exchange of students for study and exchange of teachers for Teaching, Research, Joint Research Projects and Consultancy services and Workshops. Some of the initiatives include:

1. School of Aeronautical Sciences Technology Information, Forecasting and Assessment Council (TIFAC) Centre of Relevance and Excellence (CORE). TIFAC-CORE in Aircraft Maintenance offers Master's, Certificate Courses and Short-Term Certificate Courses in Aircraft Maintenance and Avionics for engineering graduates and employees of the Aviation Industry. Over 800 engineers of Hindustan Aeronautics Limited (HAL) have undergone specialised training.
2. Clean Energy and Nano Convergence Centre, (CENCON), established in collaboration with Dongguk University, South Korea, exploits the properties of materials at the Nano scale for various applications by developing products, meeting a relevant societal requirement besides providing consultancy services.
3. Centre for Defence Technology Studies (CDTS), in collaboration with Cranfield University offers India's first-ever 2- year MBA Defence Technology programme in the Private Sector. With a view to offering the latest and the most advanced in Missile Technology, Hindustan University has recently inked a tripartite agreement with Cranfield University of the UK and MBDA for the joint development and delivery of academic and vocational training programmes in this vital sector.
4. School of Electrical Sciences runs the Centre of Excellence in Photonics and LIDAR Research (CEPLAR) through a MoU signed between Hindustan University and IISc, Bangalore.
5. The School of Computing Sciences has initiated a Centre of Excellence in "Cyber Security". They also run the APPS DEVELOPMENT LAB (I'LAB) with 30 high-end systems (Quad - Core Processor, high-definition graphics with LED Screens and other innovative features).
6. School of Mechanical Sciences' initiative, HINDUSTAN, Simulation And Engineering Design Facility (H-SIMENDES) teaches and researches on the best practices in "Product Life Cycle Management" through virtual product design, virtual product testing, virtual product manufacturing and virtual collaboration for product development.
7. ROBOARTIS, the Centre of Excellence for Design, Robotics and Automation, an initiative of the University has been established for promoting "Industrial Automation with Robotics"- an interdisciplinary centre involving the Schools of Electrical Sciences, Computing Sciences and Mechanical Sciences.
8. Centre of Excellence in Data Mining has been established in collaboration with Accenture, Industry partner and AU-KBC, Academic partner.
9. Centre of Excellence in Motorsport Vehicle Design Centre (MODEC) is involved in design and development of Motor Sport vehicles like BAJA SAE INDIA (All-terrain vehicles), Formula IMechE, Formula SAE, Supra, etc. are a few of the avenues.
10. Hindustan University and IEEE have signed an MoU recently. As part of this MoU, the Students and Faculty of HITS Engineering programmes would benefit immensely from the IEEE offerings, especially the Software Engineering Body Of Knowledge (SWEBOK) programmes, Digital Library (Xplore), E-

learning courses, technical webinars, participation in upcoming standards' definition and technical instructor-led courses custom made for HITS.

ITM University, Gurgaon

Prof. Prem Vrat, Vice Chancellor

1. The University has a strong research focus and has established a Central Research to boost the research initiatives. Over 21 multidisciplinary research groups are engaged in the research projects. Some of the interesting projects are: Quality of Ground Water and Geo-Synthetic Material for Water Treatment, Speech Signal Processing, Fuzzy Systems, Data Mining and Logistics Management.
2. Faculty at the University are inspired and incentivised to write research papers. Over 250 research papers were published in various national and international journals by the ITMU faculty in the academic year 2013-14. The University has over 100 research scholars pursuing Ph.D., a powerful measure of our research orientation. The faculty at ITM University has initiated several initiatives to encourage an atmosphere, conducive to carrying out research.

IEC Engineering College, Greater Noida

Dr. Kulneet Suri, HIO

IEC-GI has developed a new ten-year strategic plan - Strategy 2020 - as a result of extensive discussion, research and consultation both within the college and with its extended community. As part of Strategy 2020, six imperatives have been identified, each of which is associated with a series of specific, measurable goals:

1. Prepare diverse learners for job success
2. Be an enabler of the innovation economy
3. Invest in the creation and stewardship of high-value and high-performing partnerships
4. Leverage state-of-the-art technology
5. Build a high-performing organisation
6. Build a sustainable financial and resource model

Major Research Objectives

Within this framework, IEC's research mission is to support and advance industry and community-related

problem-solving through excellence in applied research, commercialisation and scholarship. IEC's Research and Innovation engages industry, faculty, students, and the community at large through participation in educationally and economically meaningful research projects and partnerships. As such, major research objectives include:

- ★ Actively engaging with industry and the community, especially with small- and medium-sized enterprises (SMEs) to advance applied research, business innovation and commercialisation projects for mutual benefit.
- ★ Integrate applied research and scholarship tightly within college curricula, building upon institute's existing strengths.
- ★ Promote and integrate innovation literacy and an applied research and innovation culture throughout IEC
- ★ Provide leadership at the local, provincial and national levels in applied research, innovation, commercialisation and scholarship for the college sector.

Priority Areas of Applied Research and Training

Currently, IEC has four priority areas for applied research and training. The areas include:

- ★ Technology & its implementation in domestic area
- ★ Sustainable Buildings & Green Technology
- ★ Healthy Food Product and Recipe Development
- ★ Business Innovation and Entrepreneurship

Research: For Faculty

IEC works to:

- ★ Initiate new research
- ★ Identify research-funding sources
- ★ Develop research proposals
- ★ Learn about the Research Ethics Review Process
- ★ Collaborate with or find an industry partner
- ★ Obtain project-management support for your research project
- ★ Access professional development
- ★ Publish your research on "Archive"
- ★ Access the Researcher Portal

Research: For Students

Students enrolled in IEC programmes can work on applied research projects, gaining valuable skills relevant to any future career. The students will work with the Institute's faculty and industry partners.

Kongu Engineering College, Erode

Dr. S. Kuppuswami, Director

The college gives top priority to research and innovations and is deeply involved in promoting and nurturing the same. Steps undertaken by the institution for development of research and innovation and encouragement to faculty to undertake research and bring innovation to the students are:

- ★ Open House Exhibition on Science and Engineering: It has been conducted annually for the past 13 years, this 4-day event gives opportunity to the students to experiment, innovate and come out with practical working models focused on specific needs of the industry and society. Nine projects have won patents and more are in the pipeline. In addition to motivating students of KEC, the institution also encourages the students of schools in about 70-km radius to exhibit their project in KEC during the open house exhibition.
- ★ Real-time Projects in Technology Business Incubator at Kongu Engineering College (TBI@KEC): TBI@KEC, a unique facility in the KEC campus established with the support of DST/ Government of India has been functioning for more than a decade now with the motto of "Concept to Commercialisation". Students and faculty work hand in hand with the entrepreneurs to develop innovative products and services resulting in a win-win situation.
- ★ Industry-Institute Partnership Cell (IIPC): Established with the grant-in-aid of AICTE and awarded Grade 'A', IIPC acts as a bridge between industry and institute by involving students and faculty to perform industry projects, consultancy, energy audit, specific industry problem-solving, etc.
- ★ Projects funded by noted organisations: The college has an impressive track record of executing research projects, of fundamental as well as applied nature, by students and faculty by bagging grants from AICTE, UGC, DST, CSIR, DIT, MNRE, TNSCST, etc.

PEC University of Technology, Chandigarh

Dr. Manoj K. Arora, Director

Many interesting projects have been undertaken by the institute for development of research and innovation. The faculty members are involved in continuous research-related work. As per the UGC thrust areas, the guidelines are being laid and the faculty members are divided into different research groups in their respective areas. Along with these are other research areas as per the interest of the faculty for carrying out more extensive research that gives them an edge. These research groups formed as per the faculty interest are as follows:

- ★ Aerodynamics
- ★ Nano Structures of Functional Materials
- ★ Micro Financing
- ★ Traffic and Transport Planning
- ★ Photonic Systems and Network Design
- ★ Mechatronics
- ★ Micro & Advanced Manufacturing Processes

FST, ICFAI University, Dehradun

Dr. R C Ramola, Dean

Yes, IcfaiTech, the faculty of science and technology at ICFAI University is actively engaged in research and innovations. Some of the faculty members have research collaborations with IITs, NITs and with the foreign institutions. In the year 2005, Dr. T. K. Mandal, faculty member of IcfaiTech carried out a project titled, 'Synthesis, Microstructure and Properties of PZT Ceramics' in the Technical University, Freiberg, Germany with DAAD scholarship. In the year 2010, he also worked on a project, 'Synthesis and characterisation of metal fluoride-based nanocomposite novel cathode materials for improved lithium ion battery performance' in the Institute of Nanotechnology, Karlsruhe Institute of Technology, Germany with DAAD scholarship. Additionally, IcfaiTech offers different project courses, like study-oriented project, lab-oriented project, computer-oriented project and branch-wise special projects, in the curriculum of B.Tech. programme. Our faculty members supervise the students in their project work with their expertise and motivate them through their effective classroom teaching.

Q3. What is the form of Industry-Institute dialogue that you undertake to bring relevance to the curriculum imparted in your institute?

Thapar University, Patiala

Prof. Prakash Gopalan, Director

The reputed Indian and international companies are associated with Thapar University. These include Intel, Microsoft, Wipro, IBM, Infosys, Sun, Secure Net Technologies, Crompton Greaves Ltd., TCS and CISCO Net Academy, to name a few. Thapar University also has collaborations with various Government organisations, including the Union Department of Information Technology, Central Scientific Instruments Organisation-Chandigarh, Institute for Himalayan Biotechnology-Palampur, and Indian Institute of Petroleum-Dehradun.

College of Engineering, Pune

Prof. A. D. Sahasrabudhe, Director

Partnerships and associations have created myriad opportunities in training students, in academic and entrepreneurial ventures and for nurturing interdisciplinary, inter-institutional research environment. COEP has initiated many collaborative programmes in various disciplines that seek to strengthen industry-institute partnership in an active and integrated working relationship. There are several on-going programmes in this mutually beneficial partnership:

- ★ 1 to 6 months' Internship Programmes at various industries.
- ★ M.Tech. Automotive Technology Programme is totally designed and executed in collaboration with ARAI and Alabama University, USA. Now also with Tennessee Tech University.
- ★ B.Tech. Production is a sandwich Programme with industry collaboration in which all the students, around 72 in number, are associated with industries for 2 full semesters out of 8 semesters.
- ★ In B.Tech. Metallurgy Programme, a course is offered to students in which all students of Third Year have to undergo at least one-month internship training during vacations and have to visit at least 5 Industries during the year.
- ★ Tailor-made Courses designed and executed in association with industry and corporate.
- ★ Experts from the industries are the members of departmental advisory boards which gives valuable inputs to design industry-relevant curriculum.
- ★ Representative from Industries are regularly invited to the institute to deliver talks, lectures under the programmes organised by various clubs at the institute as well as under EAGLE programme ("Energised Accelerated Growth and Leadership Excellence"). It was launched in 2013 for improving student's life-skills and soft skills and makes them ready for industry and research.
- ★ About 125 MoUs signed by the institute with various organisations - 48 MoUs with different national / international institutes and universities and 76 with various industries and other organisations.

Hindustan University, Chennai

Mr. Ashok Verghese, Director

The University constantly engages the industry to make its curriculum relevant to the industry. Some of the key collaborations include a tie-up with Volkswagen and Toyota where industry-made content is imparted to students to make them industry ready. The most recent development being the signing of MoU between Hindustan University and Volkswagen Group to offer Advanced Diploma Course in Autotronics in Chennai, India. This unique course will be offered for the first time in India through Hindustan University.

ITM University, Gurgaon

Prof. Prem Vrat, Vice Chancellor

ITM University's vision is predicated on the belief that a real-world experience is critical component of our

education and training and this is done through the rigour of summer internships in industry, focus on guest lectures by eminent industry experts, industry-oriented training programmes, regular interaction with industry experts through visits to the floors and industry-related projects. Theoretical concepts are validated with practical exposure at every stage of the syllabus. The curriculum is designed incorporating eminent industry leaders' views. Industry feedback on students, as also on curriculum, is obtained, and improvement if needed is implemented. With the above in focus, ITM University has forged tie-ups and MoUs with a number of companies such as Power Grid, M/S Sona Okegawa Precision Forgings Ltd. and Mitsubishi Electric India Private Ltd. to name a few.

IEC Engineering College, Greater Noida

Dr. Kulneet Suri, HIO

Better interaction between technical institutions and industry is the need of the hour. This will have great bearing on the engineering curriculum, industrial exposure to students and subsequent placement of young graduating engineers in industries across the country. Also, there is an urgent need to prepare engineering students for jobs in multinational companies, by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved well by bridging the gap between the industry and the academic institute.

To promote Industry-Institute Interaction following schemes are being undertaken:

- ★ Establishment of Industry-Institute Partnership / Interaction Cell.
- ★ Organising workshops, conferences and symposia with joint participation of the faculty and the industries.
- ★ Participation of experts from industry in curriculum development.
- ★ Professional consultancy by the faculty to industries.
- ★ Industrial testing by faculty & technicians at site or in laboratory.
- ★ Joint research programmes and field studies by faculty and people from industries.
- ★ Visits of faculty to industry for study and discussions or delivering lectures on subjects of mutual interest.

- ★ Visits of industry executives and practising engineers to the Institute for seeing research work and laboratories, discussions and delivering lectures on industrial practices, trends and experiences.
- ★ Memoranda of Understanding between the Institute and industries to bring the two sides emotionally and strategically closer.
- ★ Human resource development programmes by the faculty for practising engineers.
- ★ Collaborative degree programmes.
- ★ B.Tech. and M.Tech. projects / dissertation work in industries under joint guidance of the faculty and experts from industry.
- ★ R&D Laboratories sponsored by industries at the Institute.

Kongu Engineering College, Erode

Dr. S. Kuppuswami, Director

Industry-Institute dialogue to bring relevance to the curriculum:

- ★ Industry experts are members of Board of Studies (BoS) which is the body to deliberate and decide on the curricula and syllabi for the UG/PG programmes. This is revised once in two years and the industry experts actively participate and contribute to this exercise so that the academics meet the industry requirements.
- ★ Each department has got Students' Professional Association. Industry experts are invited periodically for interaction with the students and faculty.
- ★ Training and projects related to the industry are available for the students and faculty.
- ★ Direct involvement of students and faculty with the Entrepreneurs in product / process development in TBI@KEC.

PEC University of Technology, Chandigarh

Dr. Manoj K. Arora, Director

Industry-Institute interactions are of utmost importance to us. This is promoted in the campus through activities such as Industry-Institute Interaction Week, wherein experts from various fields and departments are invited for discussions to give us inputs in various forms.

ICFAI University Dehradun

Dr. R C Ramola, Dean, FST

In order to develop the industry-institute linkages, unique internship programmes are offered with the curriculum of B.Tech. programme at ICFAI University. There are two internship programmes in the curriculum, one of two months duration, implemented during the summers following the second year of study and other is of 'five and half months' duration, implemented in the final year of study. With these programmes, a strong industry-institute bonding is being established between our Institute and several reputed organisations. Our students get chance to work in the live projects of different companies and on the other hand, the companies use interns as manpower for the completion of their project. After successful completion of internship, our students find placement opportunity either in the same company, or sometimes, with the experience of this training, they acquire the ability to be placed in other companies of their interest. There are more than 300 companies that are associated with our institute.

Q4. Is there any initiative on the part of your institute for faculty and student development and if so, kindly share some of the initiatives.

Hindustan University, Chennai

Mr. Ashok Verghese, Director

Hindustan University offers multiple avenues for student development. Some of the key avenues include:

- ★ An active student exchange programme with universities across the globe. The students participate in International Summer Programmes, Internships and project work every year. Many Korean students have enlisted in the engineering department as part of the exchange programme.
- ★ Successful participation in International events & competitions conducted by NASA (USA) & many other global organisations in varied fields.
- ★ Industry collaborations with companies like Toyota and Volkswagen for customised training and placement of students with Intel Labs have been established on Campus along with the Oracle Centre, Infosys Campus Net, Centre for Industrial Design (CAID) Centre, SAP Tool Centre, Netmatics - Maths & IT Development Centre to name a few.
- ★ The University creates a unique learning environment in sports education which features the following key elements: problem-solving, teamwork, interaction with students from within the country and abroad, good interpersonal skills and above all, true sportsmanship.

For the development of faculty, the institute encourages them to enrol in Continuous Professional Development programmes so as to keep pace with technology, and also to learn how to utilise the technology in teaching methodology.

College of Engineering, Pune

Prof. A. D. Sahasrabudhe, Director

Initiatives for Faculty Empowerment

The institute believes strongly in the strategy: "recruit, mentor, reward, and retain world-class faculty and staff who are innovative, energetic, and dedicated to the highest standards of excellence". Accordingly, COEP has taken many additional steps towards faculty development and empowerment:

- ★ Faculty are encouraged to earn their Ph.Ds from some of the best research institutes in the country such as IISc and IITs. They can also attend short- term courses and get training from reputed institutes in India and abroad, in technology areas and subject domain, also in pedagogy, management and soft skills.
- ★ The institute offers encouragement and financial support to all faculty members to attend an international conference once every three years and one national conference or workshop each year. While attending international conferences, faculty are also encouraged to visit at least one university in the neighbourhood to help build relationships, explore partnerships, observe best practices and gain inspiration.
- ★ Alumni Distinguished Fellowship has been instituted through alumni-funding to provide additional remuneration to well-performing faculty and to instil healthy competition.
- ★ The process of inviting faculty from other institutes, including from outside the country is given impetus. Professors in American universities are granted sabbatical leave for an entire semester and this provision is being utilised by COEP to get them to come and teach new courses. This activity needs to be enhanced further to make up for the lack of staff.

Initiatives for Student Development

The institute strongly focuses on this very important aspect. The various student-centric activities organised at the institute are given below:

- ★ Soft skill Programmes and Business Communication is part of curriculum at B.Tech. level.
- ★ The institute has about 32 clubs and groups and it is mandatory for every student to join either of the clubs which is of his interest and actively participate in the activities organised by the club.
- ★ Students are part of a student/ alumni-based "Spandan" NGO at the college for the welfare of under-privileged group of the society and create awareness about other social issues.
- ★ Guest faculty from foreign Universities and organisations are invited to guide the students on various opportunities of Higher studies and Jobs in foreign countries.
- ★ EAGLE Programme: An innovative programme named "Energized Accelerated Growth and Leadership Excellence" (EAGLE) was launched in 2013 for improving students' life skills and soft skills and make them ready for industry and research.
- ★ Students are encouraged to participate in various Conferences/ Seminars/ Workshops organized in house/out house by the students/ for the students. Institute funds partially for attending international conference to present papers.
- ★ The activities organised by BHAU Institute of Innovation, Entrepreneurship and Leadership (BIEL) and Innovation Centre helps the students to develop their entrepreneurial & leadership skills & come up with new business ideas.
- ★ Industry visit & tours are organised for the students by college / industries.
- ★ Counselling facility is available for the students to cope with stress and other related issues.
- ★ Ten Full 'Vinod Doshi Scholarships' are provided to take care of the entire education of poor, yet bright, students.
- ★ Recently COEP has partnered with Ayushman Pvt. Ltd., a company in the space of Web-based platforms for health, in their Ayush Deep programme. Incoming students are screened for basic health parameters and an online health record is created for each student that is made available to doctors and family members as per the instruction of students.

ITM University, Gurgaon

Prof. PremVrat, Vice Chancellor

ITM University has taken a number of initiatives for faculty and students development which are as follows:

Faculty Development:

1. The leading academics and industry leaders of our country mentor our faculty and students. They mentor four to five faculty or research students and help in developing them into outstanding academicians and researchers.
2. Faculty is encouraged to write research papers in leading journals and present papers in various national and international conferences.
3. Faculty is continuously engaged in learning ever-changing technology and business environment. A number of domain-related workshops and seminars are conducted within the university. The faculty also joins such workshops, seminars and conferences conducted at the leading institutes in India and abroad.
4. Grooming faculty into Academic leaders is another initiative in practice. A 'karamyogi circle', a think tank of the University, conceives the strategy and evolves initiatives with far-reaching quality outcomes.

Students Development:

1. Encouragement to students to be a part of projects by providing them adequate funding, mentoring by eminent faculty and subsequently rewarding them.
2. GATE exams are made compulsory. Mentoring is done to the students by competent faculty, and preparatory tests are conducted to enable students score well in GATE. This initiative increases employability potential significantly.
3. Peer Tutors Scheme based on philosophy to nurture talent and provide constructive environment for academic development enables meritorious students to teach weaker students and they are suitably compensated for the time.
4. Students are offered 'Students' Study Abroad' programmes in various eminent international universities.
5. Emphasis is laid on practical, interactive teaching-learning and self-learning through LMS.
6. A large number of co-curricular and hobby-enabling societies are thriving in the campus, giving students ample opportunity to develop skills in the areas of their interests.

IEC Engineering College, Greater Noida

Dr. Kulneet Suri, HIO

IEC takes pride in its holistic approach to education, designed "to develop in students a desire and capacity for

intellectual and professional growth, leadership and service to others."

The institution's team, which includes one faculty member from each of the dept, has developed a comprehensive plan for faculty development under which workshops are delivered directly to schools during school meetings; faculty could attend workshops organised by the Faculty Development Centre, often with invited guest speakers; and colleagues who attend conferences focus on student engagement. These programmes are faculty- driven. A unique feature of the faculty development component of IEC is the multiple entry points for faculty to become engaged by degrees, depending on available time, experience, and interests.

Other options include an annual faculty success seminar for new faculty who receive course release time to attend a monthly, three-hour seminar on pedagogies of engagement. Among many noteworthy practices, three are now institutionalised. The first is a professional development day during which faculty are invited to present best practices and add their names to each department's list of faculty involved in the scholarship of teaching and learning; faculty consult these lists and mentor one another. The second is a much-anticipated annual public poster session at which faculty and students jointly present their research and a jury selects the top three posters; students receive a voucher for text books and faculty receives money toward attending teaching-related conferences. The third initiative is led by Student Affairs, where randomly selected full-time freshmen are grouped in teams which meet every two weeks with a team of mentors representing faculty, staff, and administration.

Kongu Engineering College, Erode

Dr. S. Kuppuswami, Director

Initiatives for Faculty Development:

★ Pedagogical training on joining afresh and periodically repeated
★ Faculty Development Programme to improve domain expertise as well as cross-functional approach.
★ Mentoring and motivation (including financial) for faculty to present/ publish research papers in national /international conferences/seminars /journals, conducting value-added courses, seminars and workshops and other consultancy work.
★ Financial incentives are provided to Ph.D. holders.

Initiatives for Student Development:

★ Open House Exhibitions are held on Science and Engineering.
★ Industry-sponsored programmes are conducted.
★ Opportunity to work with the entrepreneurs of TBI@KEC in Product/Service development.
★ Motivation to showcase their skill and knowledge in the form of projects / technical papers in various forums in India and abroad.
★ Various Clubs and Cells for overall personality development.

PEC University of Technology, Chandigarh

Dr. Manoj K. Arora, Director

For Faculty Development Programme:

★ For the development of the faculty, various initiatives are undertaken. The faculty is encouraged to attend the national and international conferences.
★ Many short-term courses are held at institute level.
★ Many workshops and summer schools are being organised in the institute.

For Students Development Programme:

★ Industrial tours are organised.
★ Project semester training for one semester is in the curriculum.
★ Industry-Institute Week Programmes and expert lectures are being attended by the students.
★ Different workshops on technical issues and communication skills are arranged in the campus.

FST, ICFAI University, Dehradun

Dr. R C Ramola, Dean

IcfaiTech conducts various activities throughout the year for the development of faculty members and students like departmentwise seminars, workshops, guest lectures, and visits to plants/organisations/industries. Students are groomed culturally, socially, technically and their personality, through various activities like techno-cultural fest, sports meet, placement enhancement programmes, etc. is developed.

Faculty members are developed by way of opportunities for upgrading their qualifications and also by participating in conferences/workshops and through various faculty development programmes.