KUMARAGURU college of technology

DEPARTMENT OF EIE

INNOVATIONS BY THE FACULTY IN TEACHING AND LEARNING

❖ **Engineering Education for Generation Z**

Generation Z students are with different experiences and skill sets than the Generation X and Baby Boomer instructors teaching the majority of their classes. New educational techniques are evolved to address these differences but they are also simply being grounded in good andragogy. There are five areas which are integrated into the classroom with a complete revamp of the curriculum which was carried out in 2017 Regulation.

a) Use of ICT

- **MS Teams & Google Classroom:** All the faculty members of the Department of Electronics & Instrumentation Engineering use MS Teams & Google Classroom extensively.

We manage the following tasks through the use of MS Teams & Google classroom.

1. Posting the teaching materials to facilitate flipped classroom mode.
2. Posting the time-bound assignments and manage all the submissions digitally.
3. They are free to submit their work even at late evening hours.
4. Evaluation of the students' work are quick.
5. Inviting other teachers to review and comment on the course contents.
6. Reviewing of the progress of the course by the Academic Auditor and Head of the Department.
7. Archiving the completed courses as records for future references.
8. Encouraging students to ask questions privately and also react to sensitive comments posted during assessments.
9. We let the students explain their shortcomings when not able to do a complete their work.
10. We post announcements for students.
11. Mobile learning experiences and home work for students. They can learn and work from anywhere and anytime. And Faculty members can also view the students' work from anywhere and anytime with their hand phones.

- **Use of Mentimeter**

1. We do a quick checking and consolidation of students' learning through Mentimeter.
2. Students love to participate in the quiz with a lot of enthusiasm as the privacy is protected.

b) Small Group Learning

Recent calls for instructional innovation in undergraduate education has led to lot of andragogical research. Its analysis demonstrates the following benefits of small-group learning.

- Effective in promoting greater academic understanding
- More favourable attitudes toward learning
- Increased persistence through core courses and programs

c) Integrating Online Resources

1. Major core courses in the curriculum are linked with massive open online courses (MOOC) – Coursera, Edx, NPTEL, etc.
2. Beyond this, the instructional materials prepared by leading universities like MIT and Stanford are taken as reference for preparing most of the course materials.
3. Majority of the instructional materials prepared, integrate practical components to the theoretical concepts as most of the courses are offered in the embedded mode.
4. To encourage flipped class mode of learning, the video and text materials are posted in Google class room & MS Teams.
5. The state of the art experiments to meet the current change in the technology are included in the syllabus and a detailed students' user manual has been prepared in consultation with industry experts.
6. The laboratory facilities and the instructional materials of the Virtual Labs (V-Labs) and Virtual Terminal Units (VTU) are being used by our students as our institution is a nodal centre for the College of Engineering, Pune.
7. The facility to access e-books, journals and magazines are provided by the institutional library through Web OPAC (Online Public Access Catalogue) and M-OPAC (Mobile OPAC) for search of books and other academic materials of the library (www.library.kct.ac.in).

d) Project Based Learning

Researches in the learning methods have opened new vistas in Project Based Learning. Project based learning focuses on developing critical thinking and problem-solving skills in the students. Its inquiry-based method of learning to solve the problems given as projects to the students is a style of active learning. "Project Based Learning integrates knowing and doing" when student apply what they know to solve authentic problems with intentions to produce results that matter.

Advantages are:

- Determines the Actual Knowledge
- Improves Interpersonal Skills
- Develops the Concept and Creativity
- Choice of Selecting Real World Problems
- Better Model of Assessment of Students' Skills

In project based learning students undergo various stages of problem solving through structure of the project which include various stages like project scoping, work planning, activity performing and tracking, managing uncertainties presented during problem solving activities of the project, presentation of the project, and closure. Students have opportunities to develop skills of observation, survey, research, reporting, presentation, communication, and collaboration with people involved, team building, and leadership in problem-solving approach of project based learning.

This experience is given right from first year through “Engineering Clinics” course and the students gain confidence and appear for national and international project competitions.

e) Prototyping, Student Start-up and Research

Coimbatore Innovation and Business Incubator (CIBI) is a Section-25 Company incorporated under the Companies Act-1956 on the 21st of March, 2014, is hosted by Kumaraguru College of Technology. CIBI is a Technology Business Incubator (TBI), supported and catalysed by the Department of Science & Technology, Govt. of India under the NSTEDB scheme.

FORGE is the incubation enterprise launched by the CIBI, founded with the vision to create & catalyse innovation powered enterprises that harness the power at the intersection of hardware, software, and computing technologies to solve real-world problems, creating economic gains and delivering social impact.

FORGE FACTORY – the 20,000 sq.ft incubator established in Coimbatore, includes HW junction – the fully integrated lab for full-spectrum hardware innovation offering equipment, tools, and resources in computing (AI/ML), IoT, electronics, desktop fabrication, 3D printing, drones, and automation & robotics, to support the design, development, and testing of ‘manufacturing’ ready prototypes.

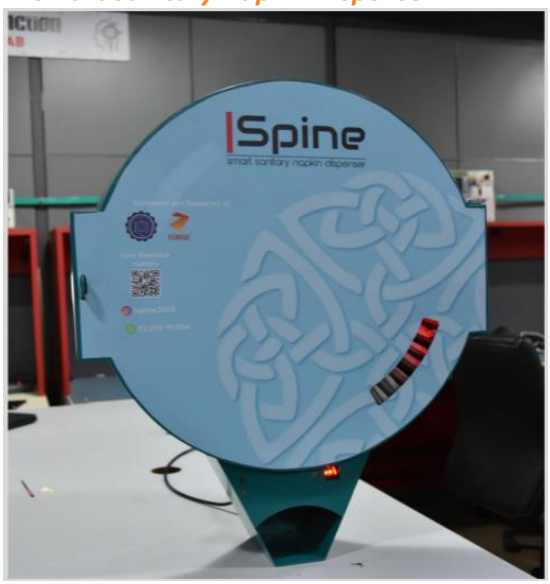
ProtoSem is a first-of-its-kind program launched by FORGE that embeds an innovation centred approach to engineering education right into the core of the engineering curriculum. It is offered as a 20-week intensive process of prototype design and development aimed at comprehensive skills and competencies development. Students will immerse in deep problem validation, customer discovery and continuously validate their innovative idea and with the guidance of industry experts design prototype to test permanently deployable solutions. In this process, the students will also learn core technical concepts and develop key engineering skills.

A minimum of 10 % of students of E&I during their course of study, undergo this rigorous training and many of them came out with flying colours with innovative products and start-ups.

iQube Centre is an established project centre filled with all necessary infrastructure for multidisciplinary project making exercises. This centre is active in bringing students from all branches of engineering who are passionate about building technologies. The centre facilitates with the formation of students groups based on their skill sets to work on various projects and help them to present their prototype model in national and international project competitions. Students of E&I enthusiastically involve in such projects and spend their time effectively during late evening hours and holidays. The outcomes are obvious as there are international and national level project winners from the Department of E&I with the support of iQube Centre.

Smart Versatile Medicine Dispenser

Smart Sanitary Napkin Dispenser



Sample Cases of Prototyping & Product Development in iQube by Ms. Sharmila and Ms. Muthuperiyaval & Ms. Harshavarthini from E&I during their Final Year of Study

❖ Project Based Learning Framework

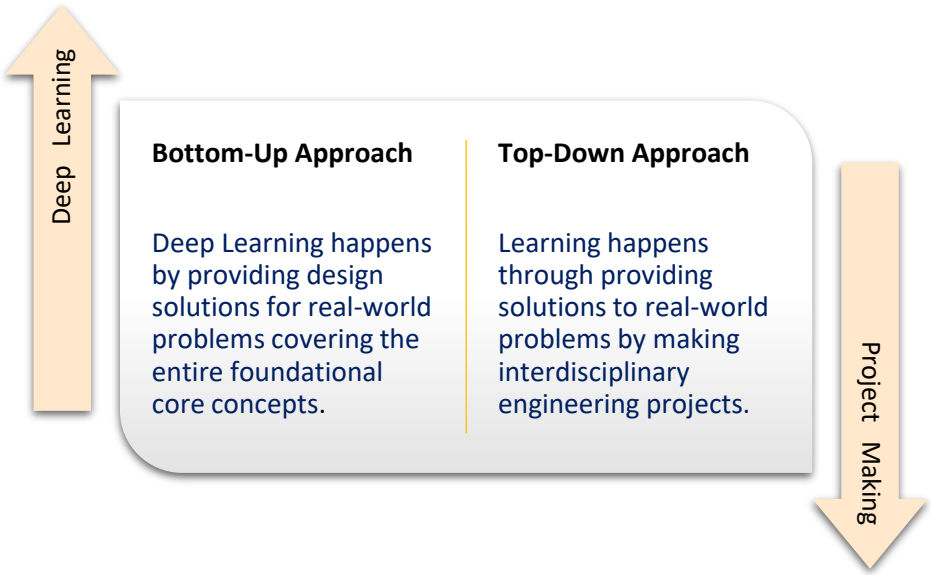
Emerging Learning Models

- ✓ **Problem Based Learning:** A sample real-time problem explained by the teacher covering all the concepts & open-ended problems given to students to work out.
- ✓ **Project Based Learning:** Opportunity to develop knowledge and skills through engaging in projects set around challenges and problems they may face in the real world.
- ✓ Design Thinking: Supports and structures the creative process of generating ideas.
- ✓ Case Study/ Scenario Based Learning: Engages students in analysis of specific scenarios that resemble real-world examples.

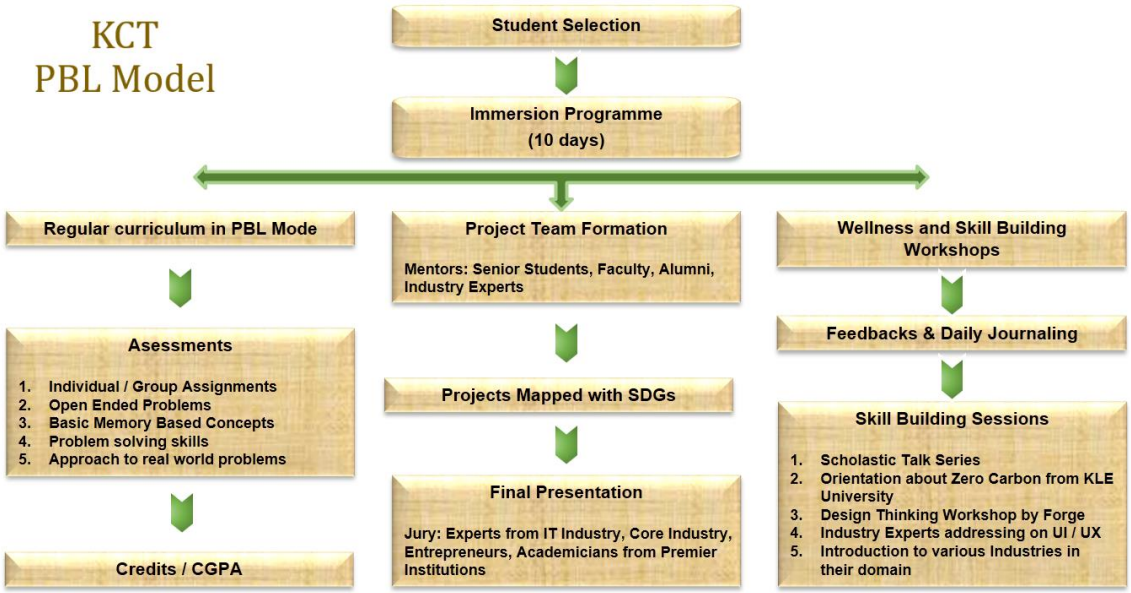
- ✓ Meta-questions: Framing questions designed to structure student work.
- ✓ Threshold Concept: Opening up a new and previously inaccessible way of thinking about something.

Evolution of KCT PBL Model

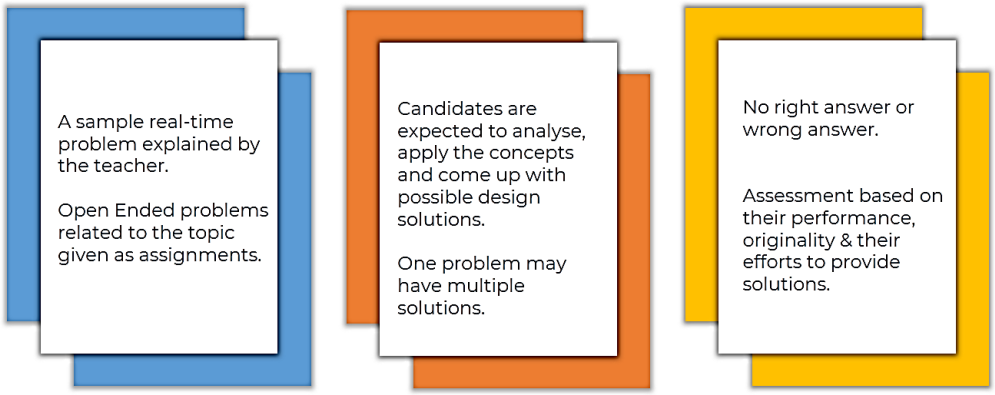
- Started in the Academic year 2020-21 - Odd Semester for I year B.E. / B.Tech Students
- Cohort I – 58 students | Cohort II – 97 students
- Cohort III – 75 students | Cohort IV – 141 students



KCT PBL Model

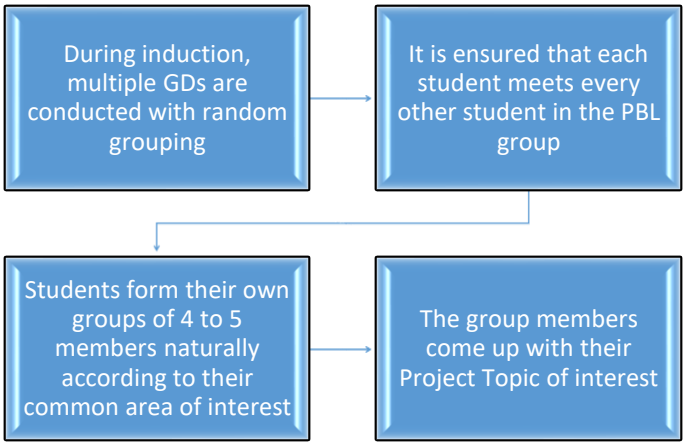


Regular Curriculum in Problem Based Learning Mode

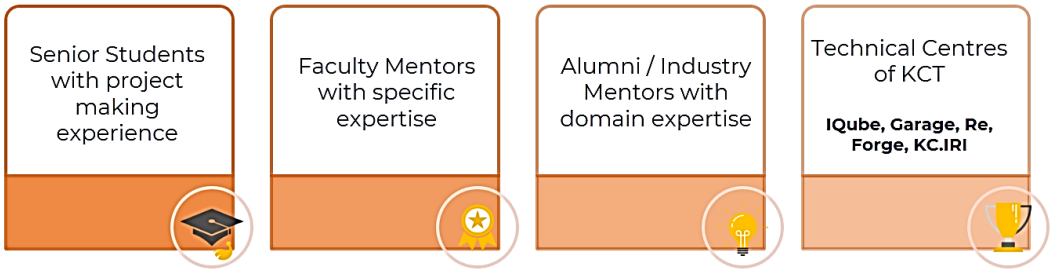


Project Based Learning

Formation of Project Groups



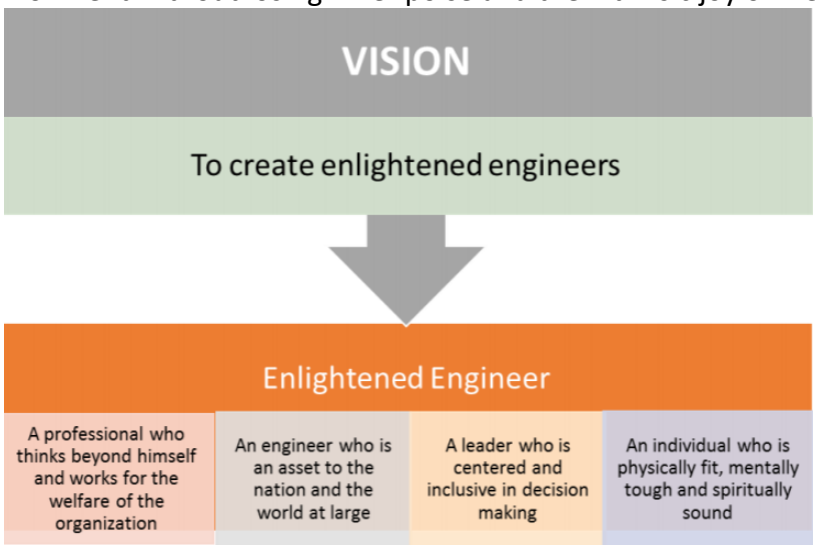
Project Mentorship



PERR Model

❖ **Holistic Development of Students through Human Excellence – Value Education Program**

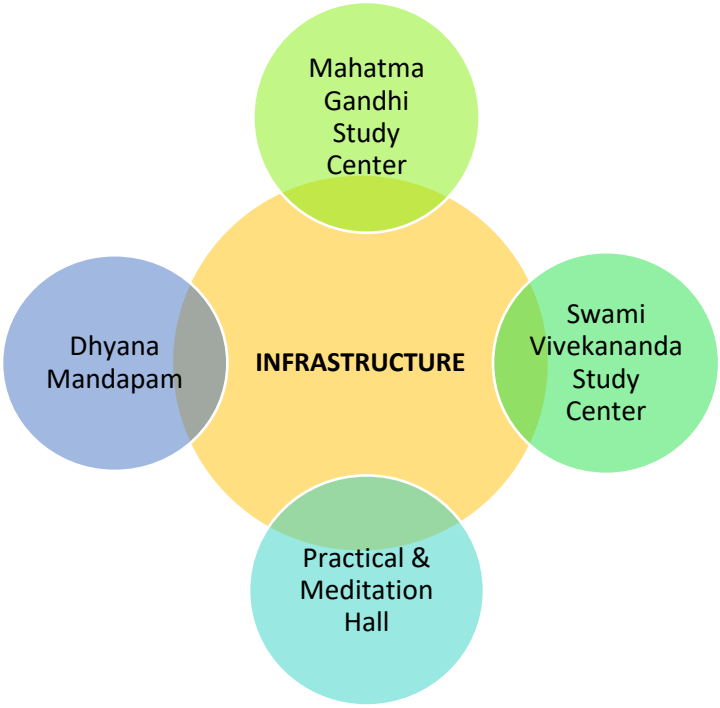
The Human Excellence - Value Education Program was started by KCT in the month of September 2009 with a mission to impart knowledge about Indian culture, ethics, values and spiritual principles in a modern idiom to the youth by employing a scientific and rational approach. It helps the youth to unfold their hidden potentialities and achieve excellence in every field of life. In short, it is an effective human resource development program which can lead to total human fulfilment. Human excellence is indeed the right prescription for the Indian youth today who wish to succeed in a modern, competitive and global environment without losing inner poise and the intrinsic joy of life.



Vision & Mission of the Department of Human Excellence

Infrastructure

Department of Human Excellence is having the following facilities through which the value education programs are inculcated to the students.



Swami Vivekananda Study Centre

Swami Vivekananda, the warrior monk is the most inspiring spiritual guru of the previous century. Swami is credited to have bridged the gap between the west and the east. Swami Vivekananda inspires the people especially the youth with his bubbling energy and revolutionary thinking. When the people of India languished in poverty and inaction, he is the one who aroused people into action.

Kumaraguru College of Technology committed to transform the life of the youth, started the Swami Vivekananda Study Centre on 2nd Nov 2011.

- OBJECTIVES
- Creating employable youth and enlightened citizens
- Empowering the youth to enrich the Nation
- Channeling youth energy towards Character Building
- Arousing enthusiasm among youth

Objectives of Swami Vivekananda Study Centre

Swami Vivekananda Study Centre includes a photo gallery depicting the life and message of Swami Vivekananda, a unique library with about 800 inspiring books on life and works of Swami Vivekananda and Sri Ramakrishna Paramahansa. The centre also screens documentary films on Swami Vivekananda, organizes tours to historical places connected with Swami Vivekananda and spreads the messages of Swami Vivekananda in nearby Villages. The centre also conducts activities such as Spoken English Classes, Study Circles, Public Speaking Classes, Hand- Writing & Essay- Writing Classes, Personality Development Classes and competitions like elocution, recitation, Skit, Painting, Singing, etc.

Mahatma Gandhi Study Centre

KCT is not only committed to provide quality technical education but also prepares students for a virtuous life. Swami Vivekananda once said that “Education is not the amount of information that is put into our brain but a life building and a character building exercise. Mahatma Gandhi is an epitome who lived by the words of Swami Vivekananda. Studying the hallowed life of Mahatma Gandhi itself will inspire youth to pursue a virtuous life Late Arutchelvar Dr. N. Mahalingam, founder of Kumaraguru College of Technology instituted MAHATMA GANDHI STUDY CENTRE (MGSC) on 11th June of 2009 to instil Gandhian thoughts in young minds.

FACILITIES	ACTIVITIES
• Photo Gallery consisting of 100 photos of Mahatma Gandhi • Display of Tributes to Mahatma Gandhi by eminent world personalities • Unique library Books written on Mahatma Gandhi • CDs and DVDs on Gandhiji's life • Air-conditioned Hall • Public Address System and Screening facilities	• Gandhi jayanthi day celeberation • Gandhian Movie week • Sarvodya day • Screening of Documentary films on Gandhi • Briefing on Gandhi's life and message • Introducing students in carrying out Gandhian constructive Programs • Arranging lectures by distinguished Gandhian scholars on various aspects of Gandhian Thought.

Meditation & Practical Hall

- Hall with an area of 3600 sq. ft.
- Equipped with floor mat and other necessities for Yoga
- Group meditation and Yoga practical can be performed by 150 persons at a time
- Spiritual lectures and Yoga competitions
- Celebration of International Yoga Day on 21st June Yearly
- FDP & Stress relief programs

Gnana Sabai & Dhiyana Mandabam

Focusing one's mind is an essential element to achieve anything that we desire and meditation is one of the established ways to achieve it. The whole thing about meditation and yoga is about connecting to the higher part of yourself. The serene, quiet interior of the air-conditioned Dhiyana Mandapam and Gnana Sabai provides just the right environment to all our students, staff and guests to meditate.

Courses Offered

Human Excellence Value Education program is offered to all the B.E. & B.Tech. branches as a mandated course. The value education program is designed for seven semesters starting from the first semester with personal values and concluding in the seventh semester with Global values as follows.

- Personal Values in Semester 1
- Interpersonal Values in Semester 2
- Family Values in Semester 3
- Professional Values in Semester 4
- Social Values in Semester 5
- National Values in Semester 6
- Global Values in Semester 7

Workshop Method with Activity Based Learning

To improve the impact and effectiveness of inculcating Values to the young minds, the workshop mode of learning was designed with revamped syllabus and introduced from the year 2017.

Highlights of the workshop mode includes:

- Team of faculty members
- Activity Based Learning
- Consultative Mechanism
- Team Activities and Projects
- Practical Learning
- Outcome Based Education
- No Examination

Pedagogy

The pedagogy of Human Excellence Value Education is vibrant and student cantered approach which aids the vision of providing outcome-based man making education. The syllabus is designed as various interesting modes for effective learning which are as follows:

- Activities
- Brainstorming
- Team Games
- Practical Sessions
- Discussion
- Guest Lectures
- Book Reading
- Quiz
- Case studies

Activities included in the Workshop

- Collaborative Drawing

- Interview
- MEMEs
- Debate
- Mannequin Challenge
- Short Film
- Skit

The AICTE has declared the Human Excellence Value Education as Mandatory for UG programs in all the Engineering Colleges. Besides marching towards reaching the motto of Kumaraguru College of Technology "**Character is Life** " the Department is a pioneer in fulfilling the norms prescribed by the AICTE for inculcating the universal Human Excellence to the Students.