

Innovations by the Faculty in Teaching and Learning Process (TLP)

Innovations by the Faculty in Teaching and Learning Innovations by faculty in teaching and learning are crucial for adapting education to meet the needs of a diverse and dynamic student body. By embracing new technologies, methodologies, and pedagogical approaches, educators can create more engaging, effective, and accessible learning environments. These innovations not only enhance the educational experience but also prepare students to succeed in an increasingly complex and interconnected world.

At FoE, TMU, the main focus is on the Teaching and Learning Process (TLP). Faculty members strive to come up with innovation in the TLP to make sure the stakeholders (students, parents, industry etc.) get maximum benefit out of it. Academic calendar of current session is shared with all the faculty members and students before the commencement of the semester. Semester activities are planned in the calendar, which makes it easier for faculty members to plan their teaching load. It ensures the effective and efficient conduct of TLP. FoE has adopted holistic education and has taken all necessary steps to curate the beyond curriculum scheme and syllabus of the university in the autonomy to strengthen the performance of students. TLP with the course file are decided at the department level by the Academic Review Committee (ARC) and are approved by the Head of Department. This practice helps in maintaining a consistent development of the students, department and the institute. FoE Innovation strategies for TLP is future ready to meet the need of any pandemic/critical situation like COVID19.

This framework has been designed for transforming traditional educational paradigms and ensuring that teaching and learning methods are relevant, engaging, and effective. Let's break down the key components of this framework:

1. First aim is Accessibility

- a. *Inclusive Education*: Innovations should aim to make education accessible to a diverse range of students. Providing various modes of delivery, such as online courses, and open educational resources, to accommodate different needs like:- e-books, video lectures, and spoken tutorials.
- b. *Flexible Learning Paths*: Providing the facility to the student to select any course and technology from the various to accommodate different needs and schedules. like:- Elective Subjects, Content beyond student training.

2. Interactivity

- a. *Engagement*: Creating opportunities for active learning where students interact with content, peers, and instructors to deepen understanding by using quizzes and assignments.
- b. *Collaborative Learning*: Encouraging teamwork and peer-to-peer learning through group projects and group discussion.
- c. *Technology Integration*: Utilizing digital tools like virtual simulations (Visual Algo), virtual lab, DrawIO etc. to make learning more dynamic and immersive.

3. Mastery

- a. *Competency-Based Education*: Focusing on students achieving a high level of understanding and skill proficiency, allowing them to progress at their own pace once they master a topic. like:- GATE and NPTEL certification.
- b. *Personalized Learning*: Tailoring education to meet individual student needs, interests, and abilities to guide instruction and provide feedback.
- c. *Assessment Innovations*: Implementing our own ideas methods that go beyond traditional exams to include portfolios, project-based assessments, and formative assessments that inform and improve learning. Like:-Hackathon and Technovinja events.

Objectives and Benefits:

1. For Students:

- a. *Enhanced Learning Experience*: Students benefit from more engaging, relevant, and flexible learning opportunities that cater to their individual needs.
- b. *Improved Outcomes*: By focusing on mastery and personalized learning, students achieve deeper understanding and greater retention of knowledge.
- c. *Increased Engagement*: Interactive and collaborative learning environments increase student motivation and participation.

2. For Faculty:

- a. *Professional Growth*: Faculty members gain new skills and knowledge in innovative teaching practices and technologies.
- b. *Increased Effectiveness*: Innovative methods can lead to more effective teaching, helping faculty achieve better student outcomes.
- c. *Greater Satisfaction*: Engaging with innovative teaching practices can lead to higher job satisfaction as faculty see more positive impacts on their students.

3. For Institutions:

- a. *Enhanced Reputation*: Institutions that foster innovation in teaching and learning are seen as leaders in education, attracting students and faculty alike.
- b. *Better Student Retention*: Innovative practices that enhance student engagement and satisfaction can lead to higher retention rates.
- c. *Improved Learning Ecosystem*: Institutions benefit from a more dynamic and effective educational environment that supports continuous improvement and adaptation.

Implementation Strategies:

- 1. *Professional Development*: Providing training and support for faculty to adopt and integrate innovative teaching practices and technologies.
- 2. *Research and Development*: Encouraging faculty to engage in research on educational innovations and their impact on learning outcomes.
- 3. *Resource Allocation*: Investing in the necessary tools, technologies, and support systems to enable effective implementation of innovative practices.

4. **Collaborative Culture:** Promoting a culture of collaboration and sharing of best practices among faculty to foster continuous improvement and innovation.

Challenges and Considerations:

- a. **Resistance to Change:** Faculty and institutions may face resistance when implementing new methods, requiring careful change management and support.
- b. **Resource Limitations:** Innovations often require investment in new technologies and training, which can be challenging for some institutions.
- c. **Assessment of Impact:** Measuring the effectiveness of innovative practices can be complex and requires robust evaluation methods.

Proposed framework serves as a comprehensive guide for faculty to drive innovation in teaching and learning, aiming to create an educational environment that is inclusive, engaging, and focused on mastery. By embracing these principles, educators can significantly enhance the quality and effectiveness of education for all students.

Goals of Innovation in TLP

Faculty members are encouraged to promote innovations in TLP for inducing following in students:

- Critical Thinking
- Sense of adventure
- Tackle the challenges in future
- Confidence and skill to continue to adopted
- A new way to approach and solve the problem

Teaching Methods used by faculty has been mentioned in figure 1.

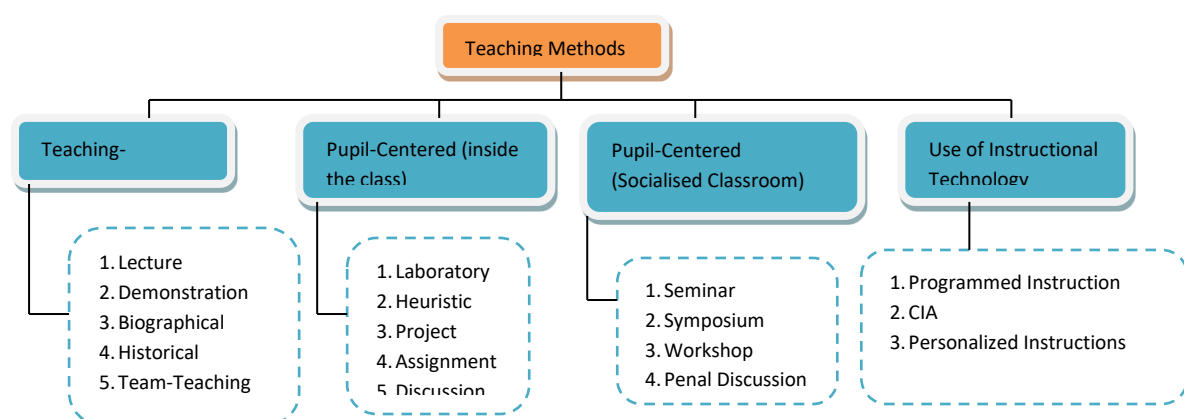


Figure 1: Teaching Methods

The Faculty of CSE department have developed some innovative way to deliver best quality Academic as well Industry level education. The details are a under:

1. Multimedia Learning Process

Faculty members are using multimedia devices such as LCD projectors in the classroom. It will help the faculty to represent the content in a more meaningful way using different media elements.

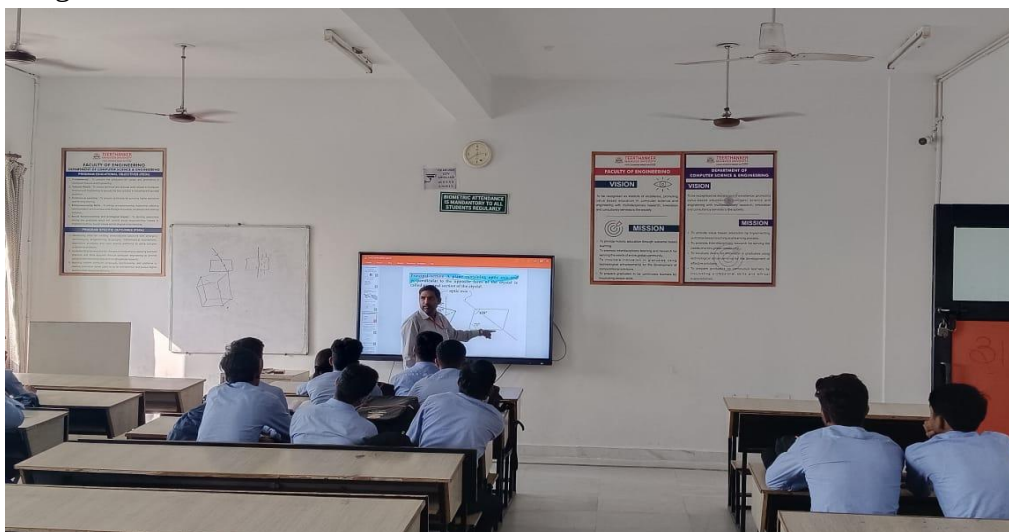


Figure 2: Teaching through SMART BOARD

2. NPTEL Lectures

Department of Computer Science and Engineering is integrating NPTEL lectures with classroom sessions. Faculty encourage students to register themselves in NPTEL online courses for learning extra content beyond syllabus.



Figure 3: Students completed NPTEL Certification

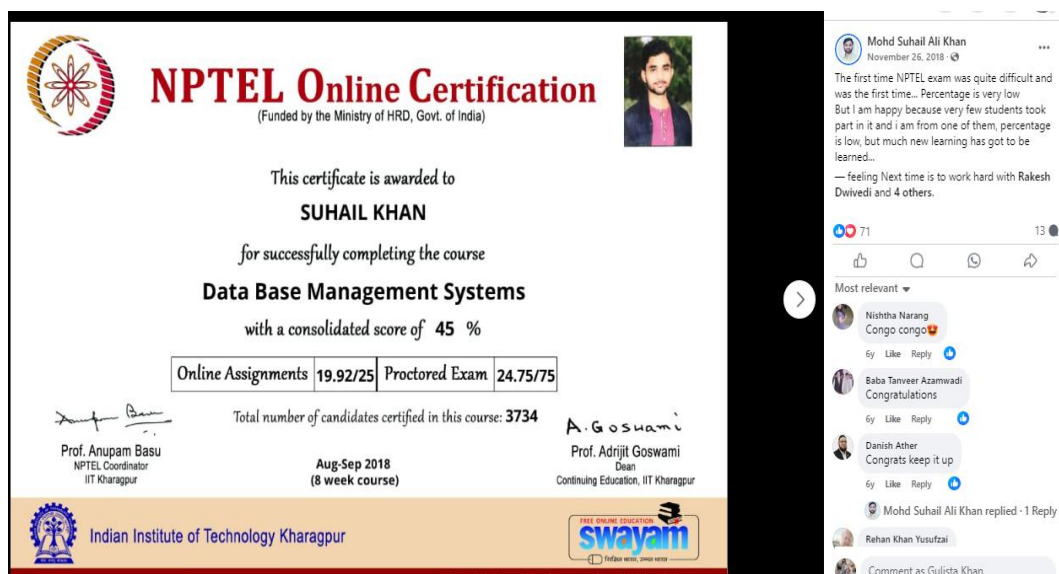


Figure 4: NPTEL Online Certification of students

3. Spoken Tutorials

Faculty members avail spoken tutorials conducted by IIT Bombay (spoken-tutorial.org) and MOOCS such as www.coursera.org, edX.org etc to enhance the learning of the students beyond curricula. With this, students learn activities in a more efficient way and get more involved in the activity. URL: www.spoken-tutorial.org

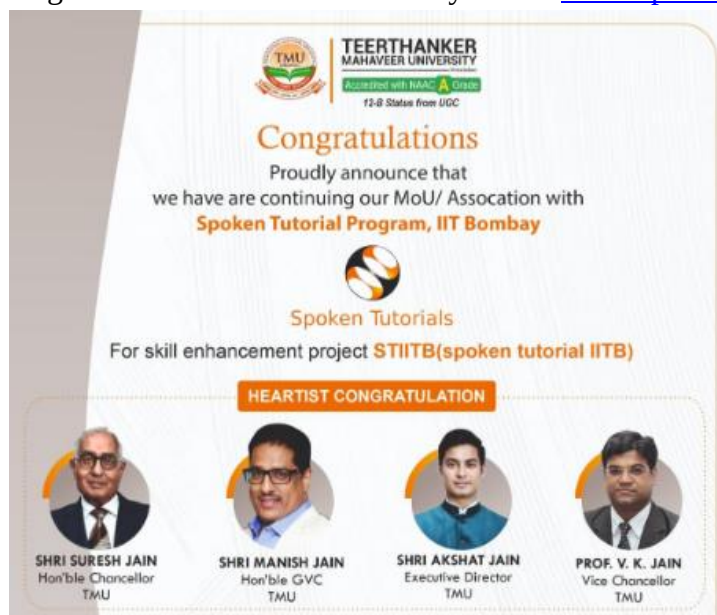


Figure 5: MoU with IIT Bombay Spoken Tutorials

4. Coding Contests

Faculty regularly conducts coding contests to encourage and enhance the programming skills of students both in languages and development tools to make them industry ready.

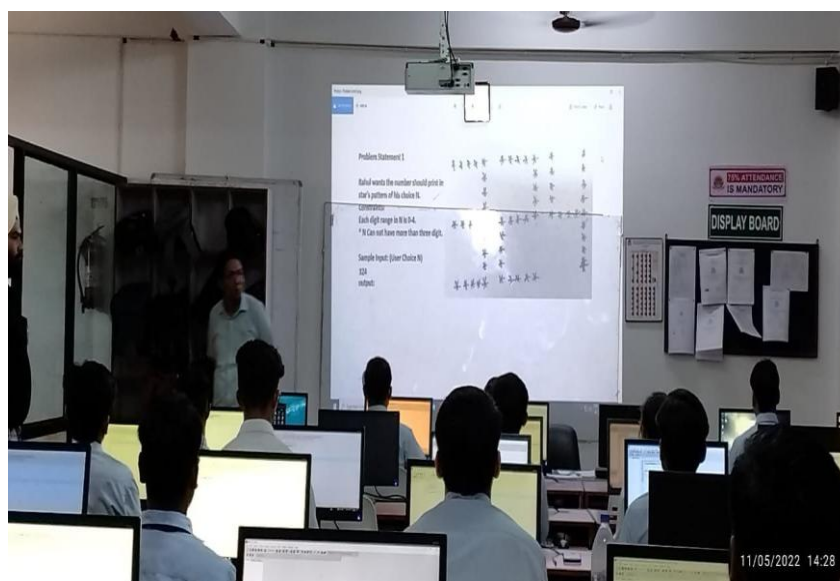


Figure 6: Coding Contest at Faculty of Engineering

5. Technical Quiz

Faculty conduct technical quizzes in their respective subjects which will improve the quality of student learning. A tool called quizzzy is being used to conduct such type of quizzes.



Figure 7: Technical Quiz competition at Faculty of Engineering

6. Remedial Classes for Slow learners.

The department has taken an initiative to conduct remedial classes for slow learners based on their performance in both university and internal-examinations. Students having difficulty in learning are regularly identified and special remedial classes are organized for them where extra problems are solved and examples are discussed.

7. Content beyond Syllabus for Smart Learners.

Faculty identifies smart learners in every class and they give extra focused assignments to those smart learners which may help them in competitive exams and placements. This in turn will help them in getting internships in industry. College identifies top

three performers in every class and awards them with medals every year. It is hoped that this initiative encourages other students to strive hard in studies.



Figure 8: Principal Excellence Award for fast learners

8. Mentoring / Counselling students who are slow / fast learners.

Each faculty is assigned a group of students for counselling. They counsel students in all aspects. For fast learners Faculty mentor students in taking exams like GRE/TOFEL/GATE/IELTS/CAT. For slow learner extra classes arranged.



Figure 9: Workshop on GATE Preparation for students

9. Workshops on new Technologies/Tools.

Department conducts workshops and seminars by internal faculty and external resource persons for students and staff from time to time to acquire skills in new technologies/tools. This will enable them to be in touch with current trends in the computer world.



Figure 10: Workshop on Cloud Infrastructure using AWS by Dristhi foundation, IIT Indore

FACULTY OF ENGINEERING

Teerthanker Mahaveer University (TMU), Moradabad

TECHNICAL DETAILS

- Introduction about Internet of Things (IoT).
- Introduction about Sensor & Actuator.
- Introduction about Cloud Computing.
- Introduction about Raspberry Pi.
- Introduction about Linux Environment.
- Introduction about Python Programming Basics.
- Programming Raspberry Pi.
- Talking to your Android Phone using Raspberry Pi.
- Communication with Cloud Server.
- Project: Integrating Sensor & Sending Environmental Physical Values.
- Project: Control Electronic Device using Localhost Web Server for Home Automation.
- Project: Send Sensor Values to Cloud Server.
- Project: Control Electronic Devices using IoT Platform & Sharepoint from anywhere across the World.

Presents

A TWO DAY WORKSHOP ON

INTERNET OF THINGS

[IoT]

IOT USING RASPBERRY PI

CERTIFICATE OF MERIT TO ALL PARTICIPANTS

BY

TECHNEX, IIT VARANASI

DATE: 21-22 Nov, 2022

For Registration Please Visit: tiny.cc/iot-tmu

VENUE

Teerthanker Mahaveer University (TMU)

Delhi Road, NH 24, Bagadpur, Uttar Pradesh 244001

WORKSHOP DETAILS

- A Two Days Workshop on IoT using Raspberry Pi.
- Participation Certificate to All Participants from Innovians Technologies & Technex, IIT Varanasi.
- IoT Kit will be provided only for Hands-On during the workshop. Participants will work in a group of 4 during the workshop.
- At the End of Workshop on Second Day a small competition will be organized and best performing students will get direct entry in National Level Competition to be held at IIT Varanasi during Technex'22 in May 2023.

ELIGIBILITY

- First Year to Final Year Students can participate in this Workshop. Students from all Engineering branches can participate in it.
- No Programming Skills Required, Just a Curious Mind.

COURSE FEE

Rs. 700/- Per Participant

www.facebook.com/InnoviansTechnologies

CONTACTS

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(Building Director)

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Pre-Requisite

- An Android Smartphone with Internet.
- (Minimum 1 Smartphone in a Group of 4).
- Participants need to bring their own Laptop.
- (Minimum 1.5 Laptop in a group of 4).

COORDINATORS

Rahul Sharma | Mr Rahul Vishnoi | Mr Neeraj Kaushik | Mr Prashant Kumar

r Pathak | Mr Pradeep Verma | Mr Umesh Kumar | Mr Mayur Agarwal | Mr Shashank Mishra

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Figure 11: Workshop on Internet of Things by TECHNEX , IIT Varanasi



Figure 12: Workshop on Deep Learning for multiple data types by NVIDIA Ambassador

10. Professional Societies/Chapters

Department has the following professional chapters CSI - Computer Society of India
IEEE Institute of Electrical, Electronics and Engineering



Figure 13: IEEE day celebration at Faculty of Engineering

11. Hackathon/Codeathon

A hackathon (also known as a hack day, hackfest or codefest) is a design sprint-like event in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers, and others, often including subject-matter-experts, collaborate intensively on software projects. The

department encourages students to participate in Hackathon, Codeathon and students get motivated.



Figure 14: Students participated and Won SIH.



Figure 15: Students participated and Won SIH.

12. Various Events and Activities conducted by Department

- Technical Fests
- Project Exhibitions
- Workshops Seminars
- Guest /Specialist Lectures
- Technical Paper Presentations
- Quiz Programs



Figure 16: Project Presentation at Faculty of Engineering



Figure 17: Poster making competition at Faculty of Engineering



Figure 18: Technical Blog writing competition at Faculty of Engineering



Figure 19: Project Presentation at Faculty of Engineering



Figure 20: National Technology day 2022



Figure 21: Power point presentation competition

13. Teaching Aids

Faculty use charts, models and posters etc, to explain some topics in their subject which recent advances in the respective subjects and used in the classroom teaching.

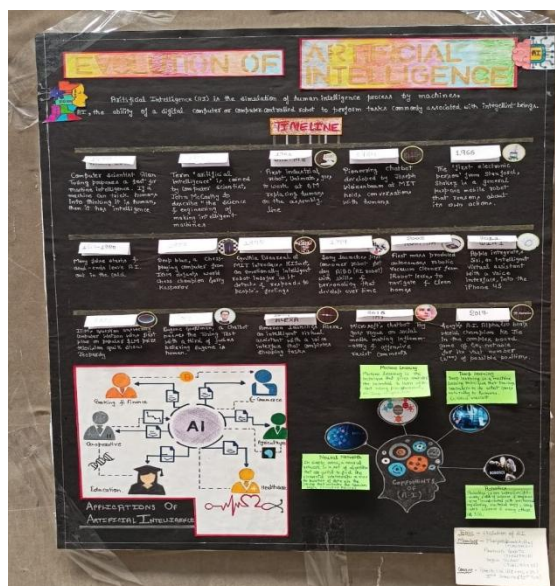


Figure 22: Teaching Learning through Posters at Faculty of Engineering

14. Train The Trainers

Faculty members who are newly joined and interested to learn a particular subject or they may want to enhance their teaching by learning from a faculty who is an expert in that subject. Trainee faculty imparts new technologies to other faculty who do not have awareness in that.

15. Digital Library

The department maintains a digital library where ebooks related to syllabus are made available. Previous year university question papers are also available for students.

- e-contents prepared by faculty are uploaded on website for self study to students. Link for access e-contents is : <https://www.tmu.ac.in/faculty-of-engineering/e-content>

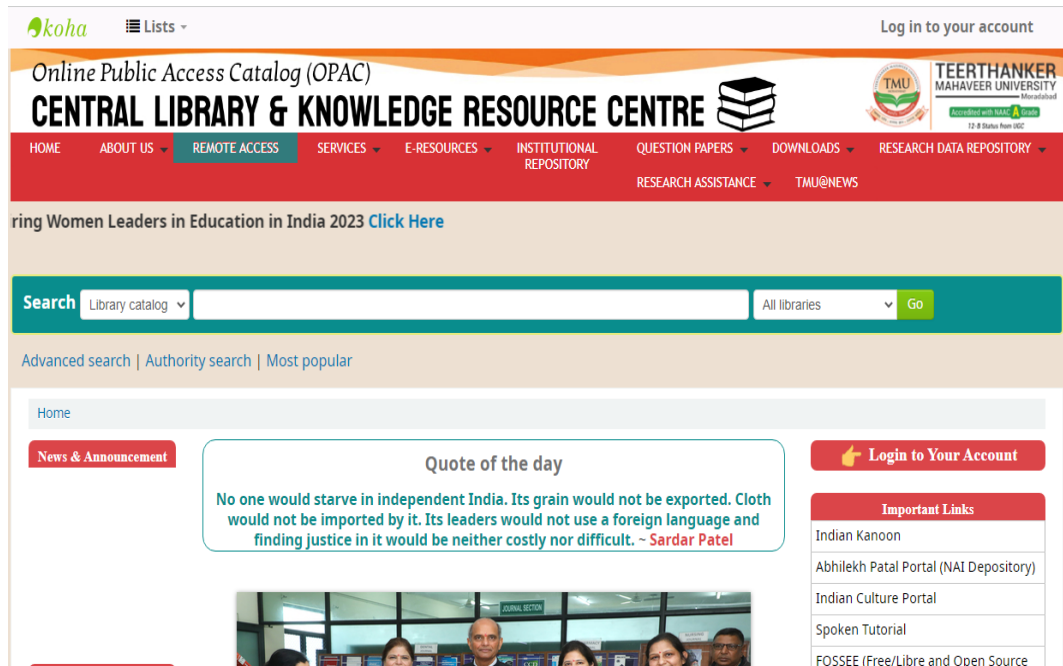


Figure 23: Digital Library

16. Flipped Classrooms

College teachers frequently use the flipped classroom model to enhance student engagement and deepen understanding, particularly in B.Tech classes where critical thinking and active participation are key.

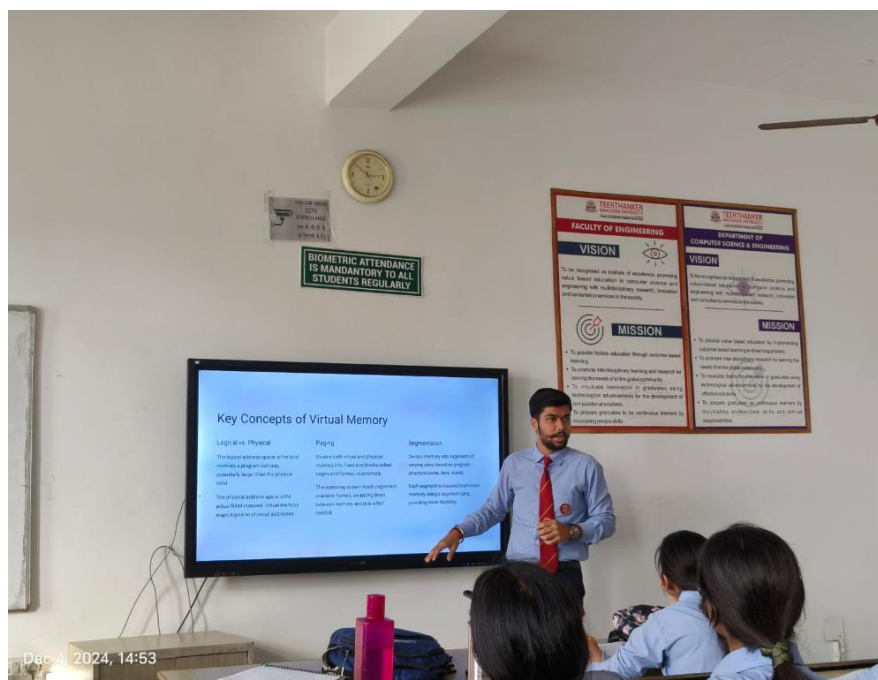


Figure 24: Flipped Classroom Methodology



Figure 25: Flipped Classroom Methodology

17. Project-Based Learning (PBL)

Students work on a project over an extended period, applying knowledge to solve real-world problems. It is effective in engineering, business, and design courses.



Figure 26: Projects made by Students



Figure 26: Projects made by Students

18. Cooperative Learning

Students work together in small groups to achieve a common goal. Faculty assigned problems to group of students and they solve problem and present in classroom. Effective for team-building, problem-solving, and fostering interpersonal skills.

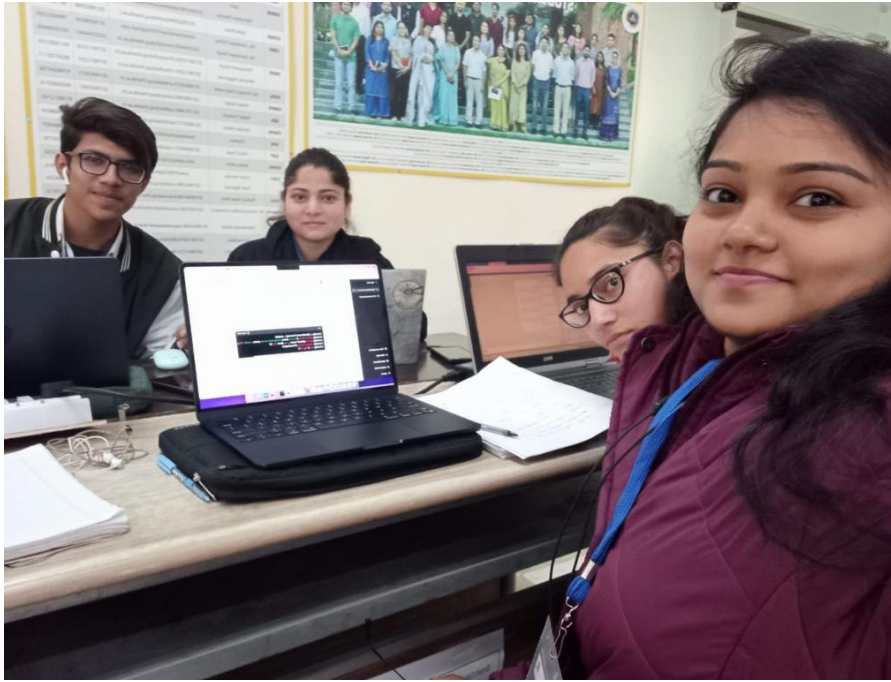


Figure 28: Cooperative Learning-Students working on Problem assigned by Faculty