

Best Practice-1

Title: Student Skill Development

Objectives:

- To provide access to resources, support systems & mentoring to the students to improve their performance
- To develop cutting edge technical skills as per industry standards
- To enhance the employability and career readiness by exposure to industry practices
- To develop leadership abilities, communication skills, teamwork and innovative ability of students

Context:

The fast-changing requirements of the engineering profession require students to possess technical skills along with soft skills such as communication, teamwork, leadership, ethics and lifelong learning. The curriculum delivered by the institute is designed by the affiliating university and it remains in force at least for 4 years till the next revision. The curricular framework may not address all aspects as per industry requirements. This may create a gap in skill sets due to prevailing university curriculum. The exponential rate of technology development demands upgradation of knowledge and the industry expects the fresh engineers to be equipped with cutting-edge technology skills. This gap between the curriculum and the industry needs to be bridged through additional training, exposure & other activities.

The Practice:

The institute has taken a number initiatives for developing the skills of students and improving their learning experiences. The collaborative training programs for imparting value added & certification courses has become an important component of this practice. Long duration “Campus to technical career (C2TC)” training program on technology tools such as SQL, Java, Git, HTML, CSS, front end development and software lifecycle development was conducted. The “Future skills program” is currently being conducted under which the students are trained on the latest software technology tools. The Google certification program is being run under which the courses on data analytics, UX design, IT support, IT automation, digital marketing & e-commerce are offered without any financial burden to the students. Apart from the technical skills, these programs also cover the training on soft skills addressing the communication skills component. The institute has conducted a separate soft skills training under Mahindra Pride Classroom for improving communication skills. An aptitude training program for improving quantitative aptitude, logical reasoning & verbal ability was organized. The students have availed the facility of online learning through digital platforms such as Infosys Springboard, Coursera & NPTEL to complete various training programs. The nodal center of Virtual Lab approved by IIT Bombay helps in performing experiments & assignments in simulated environments to better understand the basic principles. The collaboration for VMC machine helps in

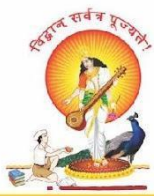
experiential learning through practical training & product development activities. The honors course on Data Science is offered for the interested students. The project based learning approach is adopted to inculcate problem solving abilities. In addition to this, technical sessions on latest developments & knowledge upgradation have been conducted. The innovation related initiatives (IIC, Innovation policy) and collaborations are helping to inculcate a culture of innovation. The Skillup club is a platform for upgrading coding skills. The students are given industry exposure through internships, industry visits & sponsored projects. The ICT tools are used by the teachers for better delivery of the instruction. The interactive panels are recently installed in all classrooms to improve the learning experience. The computing facilities & IT infrastructure are significantly improved to enrich the learning experience.

Evidence of success:

A large number of students have completed value added & certificate courses such as aptitude training, programming skills, soft skills, Google certification and other online training courses. The outcome of these training is visible in a good number of placements especially in the last three academic years. The use of virtual lab has helped the teachers to explain the fundamentals through simulations especially during the covid period when only online mode of education was available. The practical handling of VMC machine has created an interest among the students & a few students are preparing for the World Skills Competition. The project based learning approach has resulted in innovative projects by the students in first & second year. The innovation related efforts are paying dividends in the form of projects that have won awards & recognition in prestigious competitions. The Skillup club has provided a good platform for enriching the knowledge which is now being independently run by the students. As a result of improved industry interaction, a majority of students completed internships. The improvement in IT infrastructure has resulted in increased use of ICT tools for teaching-learning & also for conducting additional training programs.

Problems encountered & resources required:

A major issue was the lack of interest & motivation of students. The continuous interaction, followup & counseling by teachers resulted in things returning back to normal after the pandemic; making students understand the importance of additional training. The limitation of time constraint due to a regular academic schedule was resolved by allocating a separate time slot. A facility for hands-on practice was required for which a new computer center with 100 seats was established with upgraded computers connected in LAN & a diesel generator for uninterrupted sessions. Availability of funds was a major issue because of low student enrollments and the inability of students to pay fees during & after the covid period. The scholarship given by the government to reserved category students was not disbursed in time which created a major financial crunch. The issue was resolved by the funds given by the parent organization and also through additional revenue streams.



Best Practice-1: Student Skill Development

Sr. No.	Description	Supporting Documents
1	Campus to Technical Career (C2TC) Training program	View
2	Future Skill Program	View
3	Google Certification Program	View
4	Mahindra Pride Classroom	View
5	Aptitude Training Program-Career Launcher	View
6	Infosys Springboard	View
7	Coursera	View
8	NPTEL	View
9	Virtual Lab	View
10	VMC	View
11	Project based Learning	View
12	Technical Sessions	View
13	Innovation Ecosystem	View
14	Industrial Visits	View
15	Internship	View
16	ICT Tools	View
17	Skill Up Club	View

Best Practice-2

Title: Application Based Projects.

Objectives:

- To apply the principles learned in the curriculum to solve real life problems; developing the skills of project planning & execution, team work, technical writing, documentation, publication, presentation & overall project management.
- To enhance student's employability by implementing innovative ideas in solving problems having practical applications.
- To encourage innovative thinking and creative problem-solving with the aid of appropriate tools, leading to generation of intellectual property.
- To encourage entrepreneurship through product development during execution of the project.

Context:

The industry expects graduate engineers to possess certain basic skills & abilities such as communication, presentation, documentation, team work & management along with knowledge of fundamental principles, modern tools & techniques. A project is the visible outcome of an engineering program, providing an opportunity to apply the theoretical principles in solving real world problems. During completion of the engineering program, the students gain knowledge of different domains by studying various courses. In practice, a problem hardly belongs to a single-domain, but it involves multiple aspects from different domains. Thus, an ability to integrate & apply the knowledge from multiple domains is essential to arrive at a solution which can be learned during a project. Building a project from scratch involves various stages like idea generation, problem identification, concept selection, planning, execution & validation with available resources which help the students to build the required skills as per the industry needs.

The Practice:

The problem-solving approach is imbibed from an early stage of the student's learning. In the project based learning (PBL) course in the first year, the students work on small practical problems & find a solution under the guidance of a faculty. These involve simple problems which the students can identify by observation, reading & searching and come up with ideas which range from simple to complex. During progression of the student to higher classes, the knowledge about the fundamental principles along with technical skills is gained. The students undertake internships in third year, which help them to interact with the industry & understand its requirements. Until the student reaches the final year, he/she is equipped with basic principles & advanced techniques for solving a problem. The final year project provides them with an opportunity to apply the gained knowledge under the guidance of a faculty. In case of industry sponsored projects, a co-guide from the industry guides the students. The project starts with formation of project groups & identification of a problem. The guide helps the students in finalizing a problem statement from a number of ideas generated during brainstorming. The problem finalized is of practical nature, which may lead to an innovative solution. The project work is executed with a well thought plan, the progress of which is monitored by an internal committee through

periodic reviews, in which suggestions for improvement are given. The external assessment by an industry expert is carried out at the end of the first term to give a practical perspective & identify possible pitfalls so that appropriate corrective measures can be incorporated. In the second stage of the project, the focus is on completion of the work within the prescribed time limit. The students are encouraged to participate in various competitions to exhibit their work. An in-house project competition/hackathon is conducted wherein invited experts evaluate the projects and shortlisted projects are recommended for participation in external competitions. The students prepare a report by referring to available literature, which helps to develop the technical writing skills. The presentation at various stages help to develop the communication skills. The group working helps to build the team working skills. The students are encouraged to publish their work in a conference or as a journal article. Thus, a structured method is followed which results in innovative projects of practical relevance.

Evidence of success:

The structured method of project work has resulted in innovative solutions to the problems of practical relevance. Even the first & second year students have come up with some interesting solutions which are relevant to the industry requirements. The suggested solutions to practical problems include food waste management, hospital management, smart surveillance, blood bank management, automated chatbot, weather forecasting, smart blind stick & automatic light adjustment to name a few of them. The final year project work has resulted in practically useful solutions for agricultural applications such as analysis of soil & prediction of crop yield using machine learning and the freshness of food detection using IoT. The transportation related solutions include a smart detector for speed bump & road uncertainty, world map implementation and smart helmet using RF technology. The health related solutions include health record management using blockchain, real time brain wave tracking etc. The socially relevant solutions include criminals & missing children identification, women safety application, banking transaction handling etc. Some of the notable projects that have won awards in prestigious competitions are on early detection of diabetic retinopathy, automatic ambulance rescue system and decentralized e-voting system.

Problems encountered & resources required:

The problems encountered include insufficient access to resources & facilities i.e. machinery, equipment & skilled human resources which may not be available at the institute. The constraint on time is another concern due to the busy academic schedule demanding extended working hours. The computational & data driven projects require access to a large volume of data which may not be available in the public domain. As the project work is a group activity, the communication & mutual understanding between the team members if not managed properly can result in disputes & conflicts. The knowledge of a specific domain or advanced technology may be required which is not covered in the curriculum as other resources are to be explored. The guidance of the experienced professionals & domain experts may not be available when required. Communication & presentation skills is a common concern along with documentation & report writing ability. The financial constraint restricts the scope of the project.



Best Practice -2: Application Based Projects

Summary Table

Sr. No.	Category of Application	Supporting Document
1	Health	View
2	Business	View
3	Environmental	View
4	Agriculture	View
5	Safety	View
6	Technology	View
7	Transportation	View
8	Education	View
9	Energy	View
10	Automation	View
11	Recognition of Projects	View