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The next frontier of engineering education in India

For thousands of years, engineering has been the core of civilisational transformation. New technologies and engineering systems and products have been and continue to be at the centre of progress across sectors. The ambitious sustainable development goals cannot be achieved without a huge upgrade in engineering endeavours, and in many cases, with new technologies and mindset.

Despite the advent of many new courses, engineering education remains one of the most attractive options for students across the world. A huge number of students continue to enroll in engineering courses as Industry 4.0 and net-zero transition technologies present many bright career opportunities.

The latest data indicates high job potential for engineering graduates and postgraduates, with companies looking forward to hiring fresh talent who can help them fill the revenue or growth gap created by the Covid-19. Here are some emerging trends that are shaping engineering education:

Outcome-based Education (OBE)

Outcome-based engineering education seeks to nurture students' ability to conceive, design, implement, and operate complex value-added engineering products, processes, and systems in a modern team-based environment. The UGC, AICTE, NAAC, and NBA are encouraging implementing OBE.

OBE's implementation requires students to repeatedly engage in core engineering processes — designing, predicting performance, building, and testing — throughout the curriculum.

Choice Based Credit System (CBCS)

The UGC introduced CBCS in 2015 to broaden higher education and promote learner-centricity, flexibility, and interdisciplinarity. The extent of its implementation is an important parameter in NAAC accreditation process. NEP has also supported it. Some universities have already implemented CBCS in their engineering programmes and many more are in the process of doing so.

Concentrations, minors, and dual majors

Academic flexibility is being taken to the new level through these options. Many universities are offering option of concentrations as an opportunity to specialise in a sub-field within the core discipline. Some universities have opened up the possibilities of earning an additional minor in a closely-related discipline in engineering, mathematics, or science, or even veer off to a different discipline such as arts, design, management, humanities, or social science.

A few universities have also gone ahead to create interesting interdisciplinary programmes combining two or more different disciplines of engineering or facilitating something like a dual major by combining an engineering discipline with mathematics, social science or design.

IIT Delhi is offering BTech (CS and Applied Mathematics), BTech (CS and Social Sciences), and BTech (CS and Design). Both NEP and also some new UGC announcements are encouraging the universities to bring in more educational innovations using such flexibilities.

Industry-specific programmes

Many universities and institutions are including industry-specific engineering courses in their curricula. In these programmes, students are exposed to the latest engineering tools, technologies and trends in the engineering sector. The courses are also regularly updated from time to time.

Key partnerships

Many universities are offering flexibility to earn credits through MOOCs and courses at partner universities in India or abroad. In addition to facilitating Swayam-NPTEL courses, some progressive universities have entered into partnerships with edtech start-ups like Coursera and edX to offer free or paid access to online courses for students.

Faculty are integrating these online courses into their curricula in many different ways. Some universities also offer the option of doing a semester at some partner universities abroad.

Industry internships

For many decades, one summer internship has been an essential component of almost all engineering programs. Earlier, only a few universities like BITS Pilani had created a provision for a full semester-long internship in the final year. Now many more universities follow this model.

While there are serious difficulties in managing short-term summer internships, the industry is much more interested in engaging students for this full semester-long final year internship.

Sustainability focus

Institutions of higher education have started to include sustainability in the curriculum of various disciplines worldwide. The ability to consider sustainability-related issues in engineering processes of planning, design, and implementation is now considered as an essential desired outcome of many engineering programmes.

Many universities are transforming their engineering curricula to include sustainability-related topics in their courses. NAAC's requirement of various green campus initiatives is also supplementing this trend.

Soft skills development

Communication and other soft skills are essential for engineers as they are expected to be proficient in presentation, organisation, leadership, and conflict resolution. Increasingly engineering institutes have been including soft skills development programs and courses in their curricula in many different ways.

Nurturing innovation

Entrepreneurship and innovation have the potential of turning fresh graduates into job providers rather than job seekers. In understanding the true potential of entrepreneurship, institutions are setting up incubation centers and courses to help students hatch their innovative plans. They are also providing the necessary support from finance to infrastructure to students today and many students have come up with successful start-ups because of this process.

As industries and businesses across sectors are evolving by leveraging new technologies, engineering colleges are revamping their curriculum to meet the new industry demands. With these optimistic new trends, engineering education is well-positioned for producing engineers who can take the country's economy and technological might to newer heights. For motivated students, this field continues to act as a great gateway for some of the best careers available.

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